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Author:
Efficiency Society, New York
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[Addresses and papers]...(27 pamphlets)
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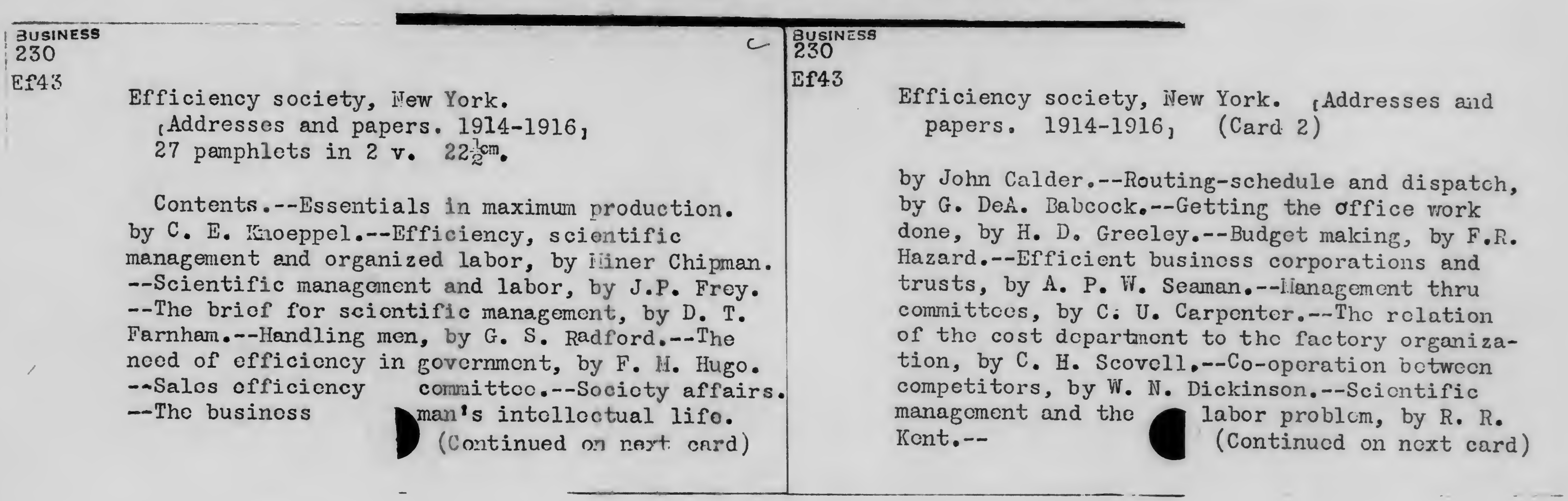

BUSINESS
230
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Efficiency society, New York.
[Addresses and papers. 1914-1916]
27 pamphlets in 2 v. 22½cm.

Contents.--Essentials in maximum production. by C. E. Knoeppel.--Efficiency, scientific management and organized labor, by Miner Chipman. --Scientific management and labor, by J.P. Frey. --The brief for scientific management, by D. T. Farnham.--Handling men, by G. S. Radford.--The need of efficiency in government, by F. M. Hugo. --Sales efficiency committee.--Society affairs. --The business man's intellectual life.
(Continued on next card)

BUSINESS
230
Ef43

Efficiency society, New York. [Addresses and papers. 1914-1916] (Card 2)

by John Calder.--Routing-schedule and dispatch, by G. DeA. Babcock.--Getting the office work done, by H. D. Greeley.--Budget making, by F.R. Hazard.--Efficient business corporations and trusts, by A. P. W. Seaman.--Management thru committees, by C. U. Carpenter.--The relation of the cost department to the factory organization, by C. H. Scovell.--Co-operation between competitors, by W. N. Dickinson.--Scientific management and the labor problem, by R. R. Kent.--
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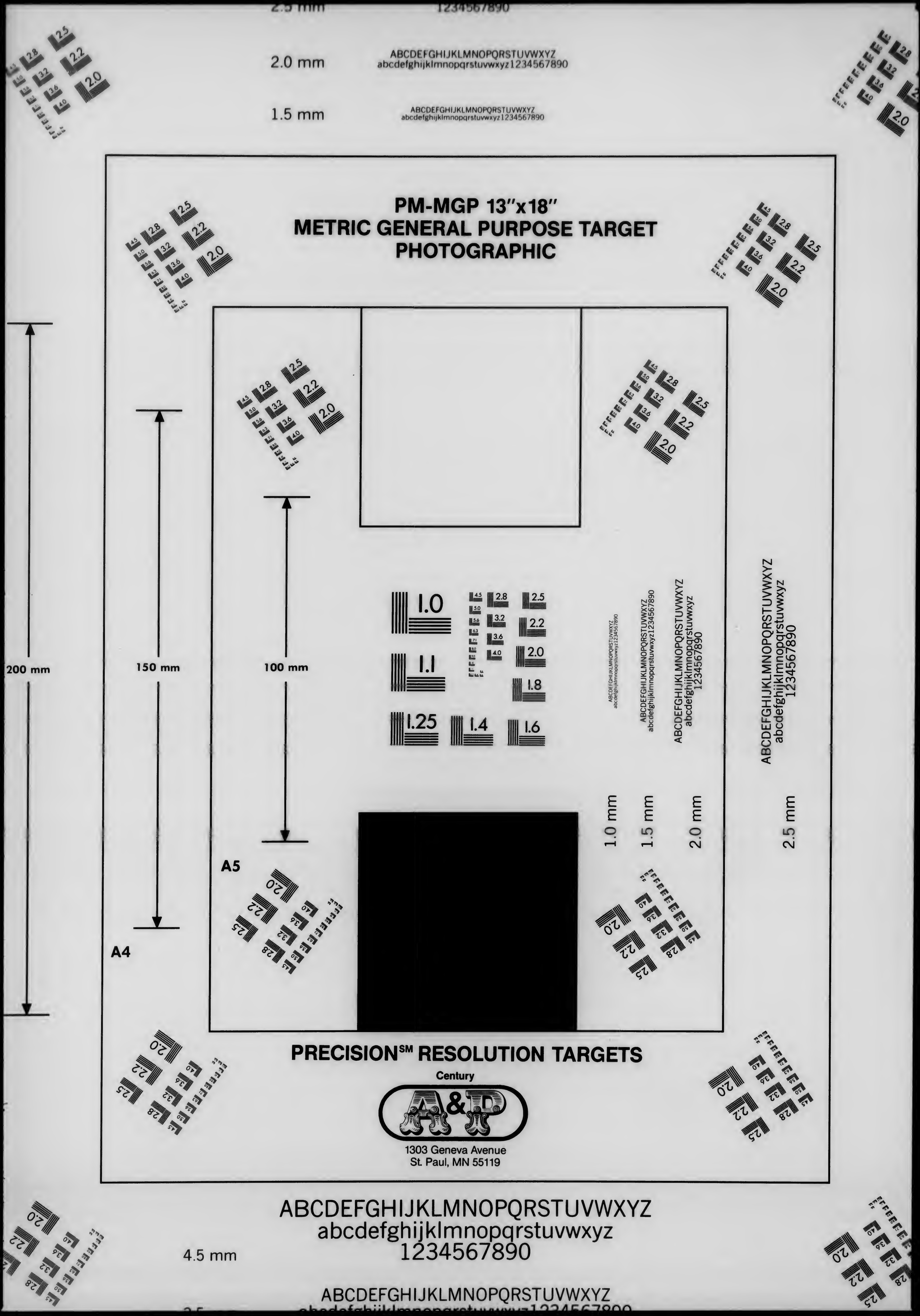

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Essentials in Maximum Production (Knoeppel) 10-9-15

An address before Efficiency Society Convention at Lake Placid Club, September 17-19, 1915, by C. E. Knoeppel, consulting engineer in factory management, New York City.

Bulletin published weekly by Efficiency Society, 119 W. 40th Street, N.Y. Volume 1, No. 27. Subscription price, $2 per year, 10c per copy. *All rights reserved.*

Rec Dec. 6, 1939

At a time when the entire world is either at war or talking war, it seems fitting to draw from this, the greatest armed conflict in the world's history, such lessons as will prove of value in determining the essentials to consider in enabling us to secure maximum results in industry.

Regardless of whether the Germans are right or wrong in this war; without considering the methods they use to achieve their ends, all must admit that they are showing the rest of the world an efficiency, both as to organization and methods, that is nothing short of marvelous.

Whether from the standpoint of husbanding their resources, or arranging for constructive financing within the empire, or recruiting their fighting forces, or manufacturing their equipments of war, or providing for their agricultural needs, or planning their military campaigns, they seem to possess an almost uncanny power for considering and taking care of the minutest details. Whether from the standpoint of defensive warfare, which has led to little in France and Belgium that the Allies can point to as successes, or the overwhelming offensive in Russia, which at this writing bids fair to eliminate this nation as a fighting factor, we must recognize that the Germans are using all the rules of organization and management that have been discovered. We are constantly reading that the Germans with their usual thoroughness, have accomplished this or that.

The Germans, after a year of war, should be down and out, according to all logical reasoning. They should be exhausted financially, agriculturally, and industrially. They should be starving, for England has taken good care to see to it that her ships keep out what the Germans might need. There should also be a shortage of munitions in Germany. Fighting men should be scarce.

All who have followed the events of the past year, however, know that the Germans have upset all logical reasoning. What was expected, has failed to materialize. The Germans are not starving; they seem to have a limitless supply of munitions; large armies of men are in constant training; all financing is done within the empire, while the Allies are spending money like water all over the world.

What is there behind this unusual and seemingly illogical condition? I am not predicting that the Germans are going to win. I do not want to be considered as even favoring the German cause. I do want to impress upon you, however, that while the German

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nation and thought may be one thing, the German method is distinctly another; and it is this with which we, as a people, should be most concerned.

It is said that almost every copper kettle in the German empire is in the hands of the government. Even fruit seeds have been systematically collected, and yield from fifteen to thirty per cent. in oil, when pressed. The claim has been made that the gas bomb is equivalent to ten thousand shrapnel shells. In the recent drive through Galicia, the Germans put three shifts of workmen in the mines and wells, as fast as they were captured. They are extracting nitrogen from the air. They inventoried everything eatable in the empire and studied the demand, then matched the two. They supervised the production of food, and superintended the manufacturing of munitions. You know of the German development of the submarine; the bringing out of the invisible grey uniform; and how they designed the 42-centimeter guns, pronounced them failures, mounted them in public parks in Germany, and when the war broke out, placed them on carriages and sent them to the front. Ten months after the war started, we find Russia and England following the methods of the Germans, with reference to the manufacture of munitions.

Lessons for Us.

Whether our sympathies are for or against the Germans is not the question. The question which squarely confronts us is whether or not we are going to consider or ignore the lessons that the Germans can teach us, which, if studied and applied, will make us the most efficient industrial nation on earth.

The Germans would be the victors if the war should end today. What is behind their success? The German strategy has been excellent: so has that of Russia and France, especially that of Russia, in the recent retreats. The German is a good fighter; so is the soldier of Russia and France. As to numbers, the Germans are decidedly inferior, while in resources the Allies have by far the better of it, and controlling the seas as they do, have the whole world to call upon.

There must be some science behind it all, for since the war began, the Germans have made a specialty of "controlled action."

Von Hindenberg, himself, frankly admits that the strategy and tactics which have made him by far the greatest single figure in this world war, did not originate in his brain. To a great extent, his maxims of war are those of Frederick the Great, who, in turn, adapted them from those of the great Chinese warrior, Loutao, who, as early as 1150 B. C. said, "The strength of an army depends less on numbers than on efficiency.

Principles of Organization and Management.

Let us therefore determine what these principles of organization and management, as applied to warfare, are, which have enabled two nations to successfully hold off seven nations on three fronts, keeping all fighting in the enemies' countries, and how these principles can be used profitably in industry.

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This is not an essay on "Why Is War?" There seems to be no sense in war; but wars have been waged since man began devising implements with which to conduct them. There must therefore be some governing principles, the observance of which makes one nation successful, while the failure to observe them makes the other lose.

Behind the German war machine is a war staff, made up of men who are experts on the various phases of the work connected with warfare. Our aim is to indicate the factors this staff considered in planning and carrying on the details in connection with this war.

Close study reveals six factors which enter into the conduct of war, and which the Germans have put into efficient practice. These will be considered, not in logical order, 1 to 6, but the reverse, as this method will more clearly bring out the essentials I have in mind.

Nations engage in or prepare for war because they believe something is going to be gained by doing so. It may be for protection and freedom from the aggression of a hostile neighbor. It may be for purposes of defence, or to right a real or fancied wrong. It may be for territorial conquest or commercial supremacy. Regardless of the point of view, war does have its rewards. There must certainly be some incentive warranting a nation to plunge into a thing as terrible as a modern war. If not, why go to war?

The Germans have had the rewards of war in mind for years, as is evidenced by their preparedness, and the writings of their military experts. We will therefore consider the sixth principle of warfare as one of *rewards.*

The German war staff, with this principle of warfare before it, knew that to win the rewards of a war, men would have to know how to fight to the best advantage—how to best endure the hardships of war. Its infantry, cavalry and artillery forces would have to know what to do at all times. Rapid mobilization would be an important factor, as well as long and fast marches. Borrowing a modern term, we have *standardization,* or the actual doing of things, as our fifth essential.

The reasoning of the war staff with reference to the fourth essential, is entirely logical. To win the rewards they had in mind would need perfect operations, which, in turn, meant that master minds would have to pull the strings and co-ordinate the thousand and one details; would have to know at all times, what to do, and when. Orders to troops, movement of armies and equipment, arrangements for feeding the men, supplying ammunition, taking care of the killed and wounded, handling provisions, would all have to be a matter of clock-like precision, the principle being that the men at the front were there to fight, and not to cook meals, bury the dead, or wait for equipment and ammunition. This is nothing but *planning.*

In order to plan, standardize, and win the rewards, what else was needed? Information of all kinds. The German, for instance, does not recruit an army from men between certain ages, altogether, as does France. A manufacturer or banker of the right age would be left at home to do constructive work for the empire, while those who could be spared would be sent into the field. This required a careful indexing of every available fighting man, with special reference to their occupation and possible service to the country in case of war. The manufacture of field equipment, guns, ammunition, clothing, were all based on the best and most reliable kind of information. The remarkable spy system of the Germans furnished other pertinent data. It is said that the family of any prisoner in Germany can find out within a very short time, where he is, what he needs, and the condition of his health. This all means *records*—our third principle.

The Germans wisely saw that to know what records to collect and then collect them; to plan properly with as little error as possible; to conduct efficient operations; and to win the rewards they had in mind, would require a personnel of such power as to enable them to properly consider what they decided upon were essential factors. They built up what is commonly termed the "German War Machine", a marvelous organization of the best brains they could find, with functions and duties so clearly and minutely outlined, as to leave no room for harmful errors and failures to carry on assigned tasks. *Organization* was therefore their second essential.

What governed the building of this organization? What records would have to be compiled? What would be planned? How would standardization be carried out, and why? *What would ensure the rewards?*

Consider yourself the German war staff, confronted with the task of applying the principles already outlined, and you would immediately ask questions about as follows:

First: What nation would you have to fight?

Second: With powerful nations all around you, how many nations would you have to fight at any one time? Incidentally, it seems that this staff considered fighting the whole world and planned accordingly, which at least shows that they left little unconsidered.

Third: What is the nature of the countries you might be forced to war against?

Fourth: What are the financial and fighting resources of the countries?

Fifth: Where would the greatest strength of the enemy lie, in its army or in its navy?

Sixth: What are the various countries bringing out in the way of war implements?

Seventh: What is the condition of the enemy as to fortifications?

Eighth. What are our resources in men, equipment, facilities, finances, etc.?

Ninth: Through what kind of country would our armies be forced to march?

Thousands of questions along the same lines, you would consider as governing the things you would do; which means *investigation* or analysis.

Principles of German War Science.

Here, then, is the list, in logical order, of the principles which the Germans considered in making war a science:

First: INVESTIGATION—Finding out what to do.

Second: ORGANIZATION—Building the machine that would properly carry on what should be done.

Third: RECORDS—Gathering facts and statistics to be used by this organization in arriving at the right kind of conclusion in carrying out what should be done.

Fourth: PLANNING—Logically arranging and co-ordinating all details, so that the various steps could be rapidly and effectually carried out.

Fifth: STANDARDIZATION—Carrying out the steps determined upon, or actually doing the work.

Sixth: REWARDS—The results of the successful application of the other five.

In other words, the Germans realized that to win the rewards of war, the actual work would have to be done, properly, by well trained men, after the most careful kind of planning, based on and as indicated by records secured through an efficient organization, which thoroughly investigated every possible feature in connection with the task ahead of them.

Let me read you a newspaper dispatch, which will give you a most excellent idea of how scientific modern warfare is. While it explains operations of the French, the Germans are really responsible for developing the plans described.

HOW GEN. JOFFRE RUNS HIS ARMY.

Dunkirk, Oct. 28 (by mail): A man in pajamas (at least he wears them most of the time, being too busy to dress) is running the 1,001 details of the French army. Gen. Joffre is at the head and he handles the big questions, presses the buttons, so to speak, but Gen. Bertholet, Chief of Staff, does the actual work.

After several trips along the fringe of the war, after meeting thousands of soldiers on the same day, some going north, some going south, in what appeared to be a hopeless tangle, it struck me more forcibly than ever that the modern fighting machine is the most complicated thing on earth.

I tried to imagine myself commanding all this, to grasp how a 200-mile line of this sort could be controlled and how it could possibly be kept from getting tangled up with itself and without interference by an enemy. My curiosity grew, until I decided to find out how all this business is managed by one man.

In Gen. Joffre's headquarters, in a certain long room, hangs a special map, the scale of which is 1-1000. It shows every road, canal, railway, bridle path, pigtrail, bridge, clump of trees, hill, mountain, valley, river, creek, rill and swamp. This is part of the outfit. Another part is a wonderful collection of wax-headed pins of all colors and sizes. These represent army units of all sizes and all organizations. Into the long room run many wires, both telephone and telegraph. Wireless apparatus is also in this room. The way it works seems wonderfully simple when it is explained.

The battle is about to commence. The troops have been distributed all along the 200-mile line. The Germans are facing them. A bell rings: "Hello! Yes! The Germans are attacking Gen. Durand's division? They are in superior numbers? The General needs re-enforcements? All right."

The staff officer who has taken this information over the phone hurries to where Gen. Bertholet is sleeping. The General has just dozed off. This is the first sleep he has had in thirty-six hours, but Gen. Bertholet is wide awake in an instant. He jumps to the floor, still wearing his pajamas, the only garment he has worn in several days. The staff officer reports.

In a twinkle, Gen. Bertholet, who knows his map as he does his own face, locates Durand's division. He knows that ten miles back of Durand's command are quartered a number of reserves, under Gen. Blanc, according to the pins. Bertholet also learns from the pins that a number of autobuses are near Blanc's soldiers.

"Order Gen. Blanc," he commands, "to re-enforce Durand at once with 10,000 men, four batteries of 75-millimetre artillery, ten machine guns and three squadrons of cavalry. Tell Blanc to transport his troops in autobuses."

Within two minutes, Gen. Blanc has received the order. Within five more he is executing it, and Gen. Durand is informed that help is coming to him.

Then Gen. Bertholet takes another nap, if the battle will permit. If it does not, he stays awake to direct men who are miles away from him.

Every time a bridge is blown up or a pontoon has been thrown across a stream or a food convoy shifts, Gen. Bertholet gets up and shifts his pins to indicate the change. Nothing happens along the 200-mile battle line but that Gen. Bertholet, still in pajamas, leaps from his bed and changes the pins on the map. The map must be kept up to the minute. Gen. Joffre must be able to look at it any time of the day or night.

As far as possible, through information brought in by spies or aviators, the forces of the enemy are kept track of in the same manner. No detail that is of use is overlooked. The pins indicate even the size of the guns, the kind of ammunition they use, and so on *ad infinitum*.

Why Not Apply This to Business?

Let me ask you this question: If a war of such gigantic proportions as this one can be conducted along such scientific lines, as indicated by the above dispatch; if something so full of things that are hard to foresee can be handled in the way outlined, what is there to prevent our developing and using successfully, a science of business? Why cannot we revise the maxim of Loutao to read: "The strength of an industrial plant depends less upon numbers or money spent, than upon efficiency."

My study of this war; my experience in industry; my discussions with associates, friends and clients, have clearly indicated to me that, regardless of whether the proposition is one of conducting a war, a sales campaign, reorganizing a business or an entire industry, the six factors enumerated are essential to success. Maximum production is entirely dependent upon a proper consideration of these factors, which, as regards industry, can be defined as:

First: INVESTIGATION—Determining what is wrong

Second: ORGANIZATION—Building the machine which will correct the faults.

Third: RECORDS—Facts and statistics showing what is being accomplished, and what remains to be done and where.

Fourth: PLANNING—Coördinating productive effort.

Fifth: STANDARDIZATION—Determining the methods to follow in actual performance of work.

Sixth: INCENTIVES—Rewarding those who perform efficiently.

The art of using these six principles, we will term "reorganization." As the engineer of the future will be a reorganizer and not an efficiency man, or an accountant or a sales counsel, we should consider the work in its broader application. You may depend upon one thing: after this war is over, industries of the world will require reorganization, and the thing to do is for the reorganizer and administrator to step forward and take his rightful place.

The efficiency movement has been a football. Many there are who scoff. The word "efficiency" has been juggled until it has lost its real meaning. Why? Because in reorganization, not enough attention has been given to the proper use of these six steps. There has been too much "hit-and-miss." There has not been enough of the "one for all and all for one" attitude. I know of a recent case. The concern in question was a sick one indeed, but the work done consisted of considering points 3, (Records), and 4, (Planning), by two entirely different men, without any relation between the two campaigns. Factors 1 and 2 were ignored. *I say in all seriousness, that a betterment campaign that does not start with an analysis of weakness, to determine what should be done, then the building of the machine to carry on the work, cannot properly install records and planning, let alone standardizing and offering rewards that can be attained.*

Efficiency Factors Defined

What are the factors to consider in the efficient use of the six principles defined? What must the reorganizer recognize in his work? Let me list them as follows:

First: Lack of science in business.
Second: Ideals.
Third: Conception.
Fourth: Program.
Fifth: Proper start.
Sixth: Views of management.
Seventh: Status.
Eighth: Local conditions.
Ninth: Presentations of facts.
Tenth: The big things.
Eleventh: Plant ideals.
Twelfth: Permanent carrying on of work.

1. *Lack of Science in Management.*

I recently received a letter from a manufacturer who said: "We think what we really need more than anything else is a foreman who can produce results, and we are now trying out a man who thinks he can do this."

This is the most eloquent summing up of the weaknesses found in a large number of manufacturing plants, that I have ever seen. You will note that the manufacturer, first of all, *thinks* that he needs a foreman who can produce *results,* without indicating in any way what the results should be; and that he is *trying out* a man who, in turn, *thinks* he can accomplish something that was not clearly defined.

2. *Ideals.*

There are two ideals to consider in any manufacturing business, as follows:

(A) The time to consider what is to be built, from the standpoint of appearance, cost, operation and saleability, *is before the order is taken.* This is the selling ideal.

(B) The time to insure the margin of profit needed to properly conduct a business, *is before the work of manufacturing is started in the plant.* This is the manufacturing ideal.

3. Conception.

In asking what a plant manufactures, I usually receive the answer —engines, or boilers, or castings, or metal furniture, or other things. As a matter of fact, what is sold and manufactured into the finished product is *time;* and this question of time, whether on the part of the salesman, or department head, or the worker, is what we must keep in mind in connection with the increase of efficiency. The problem is to study the places in a business where time is being lost or wasted, and to so organize as to increase the production and reduce the costs, without in any way impairing the quality of the product.

4. Program.

In any work of reorganization, it is very necessary that a definite program be arranged as quickly as possible. I remember in one plant, after several months of hard work, the following were the results of working with the client:

(A) He was opposed to planning.
(B) He was not in sympathy with bonus.
(C) He would not agree to a belt department.
(D) He did not believe in individual job tickets.
(E) He would delegate no authority.
(F) Time-study conclusions were met with "I don't believe it."
(G) He did not believe in keeping track of the idle time of machines.
(H) He would not consider overhead or equipment time saved, as an indication of the value of betterment methods. Savings on direct labor were all he considered as a guide.
(I) He did not feel that power costs were worth considering.
(J) He was opposed to spending money in the tool room.
(K) He was not interested in compiling costs.

As you can readily appreciate, the time of the engineer in this case was absolutely wasted, as well as the money spent by the client; all because there was no definite program to begin with.

5. Proper Start.

It is also essential that some consideration be given to the matter of the right kind of a start. If work is begun in a haphazard sort of fashion, the expected results will not be forthcoming. One, or both, of two things can be done:

(a) Announce to the various heads of the organization, in a letter, the nature of the betterment work which is about to be undertaken; or

(b) A meeting could be called of the heads of the departments, at which time a general talk could be given to them by the management, as well as the engineer in charge of the work. This plan would acquaint all with the desires of the management, what is expected to be accomplished by the work, and what the organization is expected to do in co-operating.

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6. Views of the Management.

The next factor would be to sound out the management of the particular company, as regards its particular views in connection with the work to be undertaken. In one plant, the management wanted standards before planning, something both impractical and illogical. In another, the management expected a "slam-bang" type of organization, expecting that within two or three months, the increase in efficiency would be about 30%. In another plant, the executive, as regards wage-payment methods, changed his mind repeatedly, as follows:

(a) In favor of the day-work plan;
(b) Thought the bonus plan a good one to follow;
(c) Was in favor of making time-studies, getting the men to attain the standards set for day wages without bonus;
(d) Then advocated straight piece-work;
(e) Believed that a classified wage plan was a good one; the foreman of the department to tell what the various men were entitled to;
(f) Finally concluded that the day-work plan was the best after all.

In another plant, the management thought it should have planning, and after the start was made and quite a little work under way, concluded that it was too much trouble, and recommended the discontinuance of the work.

It is therefore well to have a frank talk before much is done, as regards what the management feels should be undertaken. In this way, it will give those in charge an opportunity to consider what factors are important and should be looked into, at the same time enabling them to combat any suggestions which might prove detrimental to the ultimate success of the work.

7. Status.

In many plants, those in charge of the work have been given no authority whatever, with the result that the ultimate achievement was not satisfactory to either the client or the engineer. In one plant I have in mind, the writer was made superintendent of the plant, with the result that all expected him to act as any superintendent would. He was expected to hire and discharge, set rates, look after quality, follow production, take care of the discipline, etc., which was the procedure followed by the usual superintendent. As an engineer, his ideas were along entirely different and constructive lines. Naturally, the organization did not consider him a successful superintendent, as he was not performing any of the functions they felt he should perform.

In another plant, the writer was given the title, "assistant general manager in charge of production," with the result that the organization co-operated with him to the best advantage. In a more recent case, he was given the title, "assistant treasurer," which has enabled him to accomplish things that would be impossible under the usual arrangement, which does not give the outsider the right kind of status.

8. Local Conditions.

In one New England town, considerable ill-feeling was caused through the organization of a club in a plant, composed of the foremen, their assistants, and such of the office workers as cared to join. A chairman and secretary were appointed after a few meetings, and it so happened that both of the men selected, were Catholics. As twenty per cent. of the foremen were North of Ireland men, you can imagine the result of this feeling in a plant employing three thousand men. I am not a Catholic, but was accused of being a member of the Knights of Columbus, and therefore in sympathy with the Catholics in the plant. Both the chairman and the secretary were willing to resign, in order to stop the talk and agitation. I refused to accept their resignations, as I did not intend to be a party to a religious squabble.

In another city, the superintendent of the plant I was working with, informed me that if I would join the Elks, the methods I stood for would go in; which was equivalent to saying that if I did not join, I would have considerable opposition. I mention these two cases, so that you can give such attention to local conditions as will enable you to avoid any pitfalls.

9. Presentation of Facts.

Great care should be taken in presenting facts. I know of one case where the management claimed that its earnings would exceed $700,000.00 in one year. It was revealed, however, that it made $138,000.00, or less than one-fifth. In another plant, I was informed that fifty per cent. of the orders were incorrect. Analysis revealed that only 5.6% were incorrect. In still another plant, the statement was made that the overhead was only fifteen per cent. Investigation revealed that in the calculations, $190,000.00 had not been considered at all.

10. The Big Things.

It is essential to bear down, at times, on the big things that are unearthed. By this, I do not mean hitting the high spots, as is so often done in this work, but to impress the organization with the things that are found. In one plant, it was discovered that the concern was estimating on fifty per cent. of its capacity, with the result that they were not getting anything like their share of new business, because they were working so far below normal capacity, which naturally made the overhead rate excessive. In another plant, we found, as regards the sales, that fifteen inquiries out of one hundred resulted in orders, and of the eighty-five per cent. that were lost, eighty per cent. were due to excessive prices.

By bearing down on these two points in the different plants, we were able to convince the management and heads of departments that there was some good in the methods we stood for after all.

11. Plant Ideals.

In one plant I have in mind, a large contract was received, and the chief engineer was instructed to keep his force at work on it until completed. He objected strenuously, saying he could do better by working on the contract, stopping, and then resuming work again. The superintendent of the plant, however, was able to prove that continuous work in the engineering department would mean substantial savings in the shop. A conference was arranged for between the superintendent, chief engineer, and the writer, and after careful discussion, departmental ideals gave way to the plant ideal.

12. Permanent Carrying on of Work.

Some competent man from the organization, or secured from the outside, should be assigned to the engineer in charge of a reorganization as soon after the start of the work as is possible. If this is not done, the client runs the risk of losing considerable of value, for after the engineer leaves there are few in the organization who thoroughly understand the methods, or who are in a position to carry the work on to a successful conclusion.

Six Principles of Efficient Management.

With this brief outline, we can now proceed to a more detailed consideration of the six principles.

1. Investigation.

The reorganizer, whether he be from the outside, or on the payroll of the company, must know the business from A to Z. I do not mean by this that he must be familiar with all the actual practice, but the business must be an open book to him. I have seen too much of this looking-wise-spend-a-few-days-and-let-us-start-planning way of going at it. There is much more to this matter of investigating than most people think; or, to put it another way, few people know how to investigate. We are very apt to be careless regarding details, and overlook much that is pertinent. For instance, I will defy any man in the audience to answer all of the following questions:

First: How many buttons on your vest?

Second: How many stairs leading from the first floor of your house, to the second?

Third: How many windows in your offices?

Here are a few excellent tests of observation and mental perception:

Examine a machine you are unfamiliar with, determine its purpose, and understand its parts and relations. When you have analyzed for a sufficient length of time, close your eyes and mentally take it to pieces, and then put the parts together again.

Gaze steadily at a man working on an unfamiliar operation. Keep the mind on the object, with intentness. Close the eyes, and after consideration write all the details in connection with what you observed.

Sit quietly and exclude all thoughts from your mind, and then consider an operation you are familiar with, to the exclusion of everything else. How long can you do it?

Gaze straight in front of you, with every power of attention alert, and without turning the eyes, observe as many things as you can within the im- mediate range of vision, while counting ten slowly. Write what you saw, without again looking, and compare.

These problems have been mentioned to indicate that the human brain, unless trained, is not the power that we imagine it is. How can we assist it?, is the question. Assume that we are investigating a business, with a view to reorganizing, and the following are some of the factors which should be considered:

First: The personnel of the organization must be known in order to have an inventory of the existing material, and is determined by analyzing the force employed, with reference to

(a) Name of employee.
(b) What employee does.
(c) Where employee works.
(d) Under whose direction.

Second: The duties of all heads of departments, and assistants, should be ascertained, as this furnishes a complete outline of exactly what is done by the people employed in responsible positions. The following questions will indicate the nature of the investigation:

(a) What matters do you receive correspondence concerning?
(b) What matters do you dictate correspondence concerning?
(c) Whom do you receive orders or instructions from, and concerning what?
(d) Whom do you issue your orders or instructions to, and concerning what?
(e) What information outside of correspondence do you receive, and from whom?
(f) What information outside of correspondence do you supply, and to whom?
(g) What are the main functions or work performed by you or your department?
(h) What permanent records or files do you maintain?
(i) Are there any matters attended to by you that you feel should be attended to by another employee or department?
(j) Are there any matters attended to by other employees or departments that you feel should be attended to by you?
(k) What conditions beyond your control, if any, interfere with either your routine or the obtaining by you or your department of the best possible results?

Third: The forms used should be collected, as they indicate interdepartmental relationship, and as to each, the following questions should be answered:

(a) Who uses it?
(b) Who supplies the information from which the form is made out?
(c) In what manner is the information furnished?
(d) Who gets the forms?
(e) What other forms are affected?
(f) What use is made of the information?
(g) What is the relation between forms?

Fourth: The routing of material should be determined, as this supplies data regarding the travel of material in processing. These questions can be used:

(a) What material is used
(b) Where does it come from?
(c) In what form?
(d) What is done to it?
(e) Where does it go to?
(f) In what form?

Fifth: A set of floor plans should be made, which will establish the location of departments and machines.

Sixth: Charts should be drawn up covering the existing organization, from data collected at (2); of the methods in use from (3); and the routing of material from (4). This will give you pictures of very important phases of the business.

Seventh: Analyze present manufacturing practice in order to determine where this practice differs from that met with in other lines, with special reference to local features, complex factors, and peculiarities incident to the business in question. I know of two cases where assuming that the business in question paralleled certain lines, led to considerable extra work, until it was found that there was no connection between the two lines at all.

Eighth: Determine, as far as possible, the normal manufacturing capacity of each department with reference to

(a) All customers' orders.
(b) All stock orders.
(c) Relation between (a) (b).

and this determines what the plant can do.

Ninth: Classify equipment used in each department as to kind and number. This determines the available equipment or machinery for processing material.

Tenth: As design of product, experimenting and development of machines are important, determine

(a) How designs of product are determined upon, and the relation between design and manufacturing.
(b) How experiments are decided upon, conducted, and who governs them.
(c) How machines used to manufacture product are designed, and how and where built.

Eleventh: As considerable will depend in prescribing duties and functions upon an analysis of the features in connection with the business, the following should be studied:

(a) Rejections.
(b) Complaints from customers.
(c) Overhead or expense labor.
(d) Waste reports.
(e) Inspection reports.
(f) Employment records.
(g) Production records.
(h) Delayed shipments.
(i) Material overdue.
(j) Delays in shop.
(k) Idle equipment time.
(l) Detailed analysis of several orders to determine
    (1) Time in transit between shipment by one department and receipt by the succeeding department.
    (2) Time waiting before being started on by operators; and the time actually in process.

Twelfth: As it is necessary, in reorganizing, to know the strength of the personnel, the following questions can be asked with reference to each member in authority, considering ability as fair, good, or excellent:

(a) Responsiveness to suggestions.
(b) Ability to take criticism.

(c) Consistency in thinking.
(d) Ability to think for himself.
(e) Keenness of perception.
(f) Judgment.
(g) Accuracy.
(h) Executive ability.
(i) Initiative.
(j) Coöperation.
(k) Energy.
(l) Aggressiveness.
(m) Industry.
(n) Tact.
(o) Personality.

Thirteenth: An analysis should also be made to determine methods of inspection; what safeguards are thrown around valuable material; the extent to which safety devices are applied; how machines are set up or rigged; and the nature of the employment methods.

There are many other avenues of investigation, as will be noted from the following:

(A) As to belting:
(a) Are belts tight or lose?
(b) Are they installed properly?
(c) Are they clean, or in dirty, greasy condition?
(d) What is the alignment of shafting and pulleys?
(e) Do belts arrive true or against cone steps?
(f) Are belt records maintained?
(g) Who looks after the work, and when?
(h) How many belts in use?

(B) As to planning:
(a) Is material furnished in advance of requirements?
(b) Is supply adequate?
(c) How about the handling?
(d) What delays were noticed?
(e) Cause of delays?
(f) Who does the planning?
(g) How is it done?
(h) How far in advance?
(i) What records are used?
(j) What is the nature of the preparations covering the next report?
(k) Is material handled back and forth unnecessarily?

2. *Organization.*

I think it was this society which made an analysis of the organizations of thirty-five plants, one of the conclusions being as follows:

> "Such being the case, and taking into account as a normal condition that the flow of influence in an organization is from the top down, it would seem evident that increased efficiency will be soonest secured by applying efficiency principles initially to the personal operations of the managers, rather than to those of the workers, as has so often been done."

A writer recently said that as our organizations were organized today, not one establishment in ten could have scientific management, because not one in ten would be willing to live by its law. The most important reason for this conclusion is that very few establishments go at the introduction of better methods in the right way. The conclusion of this society is absolutely sound, for unless investigation

and organization precede the other important steps, little can be accomplished. I have in mind a plant whose general manager believed that he should direct the activities of all heads of departments, and as a result, had seventeen different men running to him constantly. As you can readily appreciate, he was a very much overworked man. During his administration, a planning department was started, although little good was accomplished from the work, due to the fact that the business was not properly organized. After the death of this general manager, the business was reorganized so that four men handled all the details, reporting to the new general manager. These four men were, a sales manager, a production manager, a treasurer, and a chief engineer. The result is today that the production and the costs are under positive control.

In building the right kind of an organization or the machine that is to carry on the things that are needed, the results of the investigation should be very carefully diagnosed, and the faults and weaknesses ascertained, after which the business should be divided into logical functions as follows:

(a) Engineering.
(b) Sales.
(c) Production.
(d) Legal.
(e) Clerical.
(f) Statistical.
(g) Financial.
(h) Executive.

or, as Mr. A. Hamilton Church defines them:

(a) Design.
(b) Equipment.
(c) Control.
(d) Comparison.
(e) Operation.

The duties necessary to perform each function should then be worked up, and after a study of the personal characteristics (as indicated by (12) of the investigation), the proper people in the organization should be assigned to take care of the duties, or, if they are not in the organization, should be secured from the outside. Finally, a chart should be made of the various functions and their definitions, as well as a chart covering the revised personnel.

3. *Records.*

I am not going to speak at any great length covering this principle, for the systematizer and the accountant have done very good work in establishing the need for the best kind of records. The right kind of an investigation and diagnosis of the troubles found will do more than any other one thing in establishing what kind of records should be produced. They are a most important part of the work, and my failure to dwell upon this factor at great length, should not be construed as meaning that they are of no particular importance.

4. *Planning.*

No argument should be necessary to prove the value of this principle, especially if you consider the dispatch describing how Gen.

Joffre runs his army. Let me, therefore, give you the theory of planning, and a few important rules to be used in introducing this important phase of the work.

Given a plant and equipment with an organization to handle the work, the manufacture of all that is designed by the engineering department and sold by the sales department can be handled to best advantage, only when the details instead of being considered independently by each department, *are controlled by one function* which can consider each detail in connection with all the others and act as a "clearing house" for all information in any way affecting the manufacturing.

With these agreed to, it is necessary to consider a few rules so important that the *success or failure of the planning is entirely dependent upon their observance.* These are:

1. No work should be undertaken in any department of the plant without an order in writing.
2. No orders are to be started until they have first passed through the planning department for attention and scheduling.
3. No job will be considered available until everything *is* or *will be* ready for the work.
4. No job is to be changed after starting until the planning department has been notified and arranged for the changes.
5. No part of an operation is to be started by a succeeding operation until the planning department has arranged for it.
6. Sufficient work must at all times be scheduled ahead so that there will be no likelihood of a machine or gang running out of work. Better to schedule too much work than not enough.
7. No material is to be moved to a starting operation without the knowledge of the planning department.
8. There must be a "next job" for every machine and gang with everything in readiness for the work.

5. Standardization.

In order that the actual doing of work may be carried on most effectually, standardization is necessary. To illustrate what I mean I might say that in a coal mine they use a car which on the "man" trips will seat four persons, two on a side, the four filling the car. If the men put their legs between the legs of the other men, each man sitting on the foot of the man opposite him, eight men can sit in the car without discomfort, and I have seen nine men in a car. This is standardizing in operation.

In order that the standardized operation may be carried out effectually, it is necessary that the governing conditions be also standardized. To illustrate what I mean, I might mention that at the top of the back of each seat in the Metropolitan Opera House in New York City, is placed the number of the exit which the person sitting directly behind is to use in case of fire or panic. Each exit is prominently marked and can easily be located. In this way, you see, the condition is standardized so that the operation of quickly leaving the theatre may be accomplished.

6. Rewards or Incentives.

I think we all agree that it is necessary, if we are to get the best work from the employee, to devote the right kind of consideration to co-operation. The best way of defining co-operation is to read the following newspaper dispatch:

> Cleveland, Nov. 22: "Government by the employees, for the employees and of the employees." This rule, displacing the former rule of the "boss" that still maintains in nearly all factories, controls the relationship of the employee to the employer in the factory of Printz-Biederman Company. The federal system of government has been applied in the Printz-Biederman factory for the benefit of the employees for the last eight months and is declared to be operating satisfactorily.
>
> Under the plan the employees have a senate and a lower house upon which devolves the duty of passing upon all questions in which the welfare of the employees is concerned. A short time ago it became necessary to cut down either the force or the hours temporarily. Instead of arbitrarily issuing a lay-off order, Alexander Printz, president, turned the facts and figures over to the senate and house. After some debate these two bodies decided upon a plan of curtailing expenses, which was put into effect.
>
> About a year ago Mr. Printz decided to depart from the old system of shop management. He called in A. J. Leitch, efficiency engineer. Mr. Leitch decided on the federal plan of government. According to the federal plan the foreman or forewoman of each of the sixty departments constitutes the senate. The employees of each department elect a member of the house from among their number and five at large, giving them sixty-five members in the lower house.

The relations between employer and employee must also be considered. In one plant it was noticed that men were working on large grindstones which were running in water. During the fall, winter and spring, the men complained very much of cold hands and arms, due to the fact that the water was cold. The suggestion was made to the management that the water be warmed; which met with their approval. In a candy factory it was observed that the girls hand-dipping centers were averaging over 80,000 motions per day; that the girls were happy, contented, and not overworked. It was found that the management allowed these girls to sing, which acted as the best kind of safety valve.

In a small town in which several hundred workmen were employed, and where there was a saloon, the men would walk over a mile, after supper, to a neighboring town where there was a moving picture house in addition to several saloons, the former being the added attraction. They would take in the "movies", meet old friends, take in the saloons, one at a time, carouse around for several hours, and then go home very much the worse for wear. Many of them would fail to report for work in the morning, or if they did report, they would be in no condition to do a fair day's work. Some of the better element complained, and as a result, the installation of a moving picture house was recommended, which would mean that most of the men would take their families to the show, send them home when it was over, go to the saloon, have a few drinks, and go home, reporting in the morning in much better condition physically than under the old arrangement.

The question of rewards should receive very careful consideration. I think there is a very important principle underlying this feature of it, which is that, for ordinary pay, men will not turn out a maximum day's output, any more than a manufacturer will furnish a high-grade article for an ordinary or average price. There should be certain standards in connection with this matter of rewards, as follows:

First: A reward should be given on factors within a worker's control.

Second: He should receive the reward as soon after he earns it, as possible.

Third: He should be rewarded in proportion to his attainment.

Fourth: If he earns a promised reward, it should be given him, regardless of the company's showing.

Importance of Orderly Industry

I am sure that if proper study is given to the outline of the six principles mentioned here, there will be less of the "hit-and-miss" in industry. After a long experience in industrial activities, I am convinced that there is more of it than most people have any idea of. As a writer recently said:

> What is meant by "hit-and-miss" in industry? We who live in this country should know. We are passionately devoted to it. We will let no one wean us from it. We suffer from it, but we would apparently die for it. Many die from it. It is the system that permits the business of the production of the necessities of life to gravitate into the hands of individuals, each of whom is permitted to go his own pleasant way. Not even our government may tell any individual what he shall produce or how much he shall produce. We have a theory that the "law of supply and demand" regulates all such matters much better than we could regulate them. England has the same idea. England would be all right today if the idea prevailed in Germany. The British steel wall would have long since done its work. But Germany has a different idea. She had it even before the war. She believed in orderly industry.

I am not prepared to say how far we can go in this country along the same lines, but I do know that there can be no order in industry if we start with records, or planning, or standardization, or even rewards, for you no doubt know of cases where the manufacturer felt all he needed was a time-study campaign and some bonus. I say that investigation and organization must precede the installation of any or all succeeding steps. When this is done, there will be less in the way of failures in the work, and the reorganizer will be the power in the industrial world that he should be.

EFFICIENCY SOCIETY

FEB.-3

Efficiency, Scientific Management, and Organized Labor (Chipman)

1-21-16

Read at the annual meeting of Efficiency Society, January 21. 1916, by Miner Chipman, of Cambridge, Mass, counsel for the workmen in Watertown Arsenal. (This is the second of a series of bulletins on this subject. It is planned to follow this with papers from a representative of organized labor and a representative of the group of consulting engineers engaged in the development of scientific management.)

Introduction.

Prof. Robert F. Hoxie's book, entitled: Scientific Management and Labor, should cause even the most enthusiastic exponent of scientific management to pause and give serious consideration to the attitude of labor toward the efficiency program. There are those who will disagree with the findings of Prof. Hoxie, and his associates, but even in that disagreement, we cannot overlook the underlying unrest, and the very potent agitation against scientific management in labor circles. It is useless to disclaim the contentions of labor on the ground of misapplication of principles. Labor is interested in the effect, not in the underlying principles, of scientific management. How does scientific management affect the worker? That was the question presented to Prof. Hoxie, and, in the opinion of the writer, his investigation stands as a model of an impartial and open-minded study of a complex sociological problem. Of greater interest, however, is the report of Mr. John P. Frey, editor of the International Molders' Journal, who was associated with Prof. Hoxie, as labor's representative, in the study of scientific management and labor. The question of vital interest at the present moment is: What is labor's attitude toward the efficiency program? It is of importance that we distinguish between "efficiency" as a measurement of human welfare, and "efficiency" as a measurement of mechanical productivity. It seems to me that it is upon this point the forces of labor split with the exponents of scientific management. We must also bear in mind that organized labor views scientific management as an operating system, affecting the work, wages and condition of the worker, and is not interested in the preachments, doctrines, and principles of scientific management as a cult. In discussing the problems involved in the relationships existing between efficiency and labor, we must realize that there are principles of human welfare as well as principles of machine production, that there are principles of social organization, as well as principles of industrial organization, that there are individual and group aspirations upon the part of the worker, as well as aspirations upon the part of the employer. The true function of scientific management should be to study and analyze the various ideals and principles, and bring about the most harmonious adjustment between them.

The object of this paper is not to defend either scientific management or the contentions of organized labor. I am interested in awakening employers and scientific management experts to a realization that there is something radically wrong with the *Efficiency Movement*. We efficiency men have been too cock-sure. We have learned a great deal about the art of cutting metals, and been able to reduce the study of motions to a science, but we have signally failed in gaining the consent of the worker. We are amused, at times, at the exposition by socialistic dreamers, of a Utopian industrial condition from which all poverty, want, and injustice have been eliminated. It may be possible that the exponents of scientific

management have indulged in Utopian dreams equally as panacean as
that of the radical socialist. Both parties, perhaps, have overlooked the
limitations imposed upon us by the great variation of ideals and aspirations
in a complex society. If we were truly righteous, truly just, truly altruistic,
if we really loved our brother man, the socialistic commonwealth would
not be a bad sort of a thing, and if we were truly scientific as well as
truly righteous, if we were of one accord as to the relative position and
value of our *brethren,* scientific management would also be a very good
thing.

As this paper will disclose, the writer believes that the future problem of scientific management is one of industrial democracy. According to Mr. Frey, the late Dr. Frederick W. Taylor said:

> "'Scientific Management' is the essence of industrial democracy. It substitutes the rule of law for arbitrary decisions of foremen, employers and the unions and treats each worker as an independent personality; it transfers to the workers the traditional craft knowledge which is being lost and destroyed under current industrial methods; lessens the rigors of shop discipline; promotes a friendly feeling and relation between the management and the men, and among the workers of a shop or group; it gives a voice to both parties—to the workers in the end equal voice with the employer—and substitutes joint obedience to fact and laws for obedience to personal authority. No such democracy has ever existed in industries before.
>
> Every protest of every workman must be handled by those on the management side and the right or wrong of the complaint must be settled, not by the opinion of either the management or the workman, but by the great code of laws which have been developed and which must satisfy both sides; both can refer only to the arbitrament of science and fact. 'Scientific Management' thus makes collective bargainings and trades unionism unnecessary as a means of protection to the workers, but it welcomes the co-operation of unionism."

Dr. Taylor's remarks are significant. They point out to us, perhaps,
one of the greatest faults of scientific management. He refers to "the great
code of laws, which have been developed and which must satisfy both sides;
both can refer only to the arbitrament of science and fact." What are these
laws? How are they evolved? Have they been accepted as laws? Can we
have democracy without complete knowledge of the law, and complete ac-
ceptance of the law as a *law?* Has it been recognized that the universe is
tied together, and works as a harmonious whole because of the counter-
balancing of opposing laws? Is it not a fact that all life, and all movement
is the result of a disturbance in the balance existing between these laws?
There are laws of ideals as well as laws of mechanics. There are laws of
leisure as well as laws of labor. A man may be physically fitted to be a
backsmith, and according to all laws of a purely physical nature be the
choice of scientific management for the job of a blacksmith. The man, how-
ever, desires to be a saleman of ribbons, and all the king's horses, and all the
king's men, could not get him to put on overalls and swing a sledge. A
young man may be scientifically fitted for a task in the town of X, and
is earning extra high wages for his efficiency, but he has a sweetheart
over in the town of B, and he moves despite the protests of industrial
efficiency. The principles controlling the love for a girl will always
transcend the principles of industrial efficiency. We must realize that
men are impelled to act through many causes, and that industrial or
productive efficiency is only one of them. I know a very expert mechanic
living in the Borough of the Bronx in the city of New York, who refused
a position of responsibility and high pay in a western city merely because
he did not want to live so far away from Broadway. Foolish, shortsighted,
inefficient—yes! He stayed in New York just the same. I had a worker

refuse to co-operate with me at one time because I assumed that his ideals and my own ideals were identical. I offered him a fifty per cent. bonus for a proportional increase in his production. The job had been standardized, scientific management had been applied to the mechanics of the operation, but the man said: "I do not want any fifty per cent. bonus, I am satisfied with what I get, and when I want more I will ask for it." That is ingratitude for you! Scientific management would have said "Fire him!" but he could not be fired. His father had worked in that mill before him, and he had a son starting down in the ranks. He had a home he had been paying for out of moneys advanced by the employer. He was a social factor as well as a productive factor in the mill. Discharging that man might have meant the total disruption of a heretofore harmonious industrial family. Mr. John P. Frey, in reply to Dr. Taylor's statement, says:

> "Organized labor has declared that 'Scientific Management' is essentially autocratic, a reversion to industrial autocracy which forces the workers to depend upon the employer's conception of fairness and justice and limits the democratic safeguards of the workers, that it tends to gather up and to transfer to the management all the traditional knowledge, the judgment and the skill of the workers, and monopolizes their initiative and skill in connection with work; that it ordinarily allows the workmen no voice in hiring or discharging, the setting of the task, the determination of the wages or the general conditions of employment; that it greatly intensifies unnecessary managerial dictation and discipline; tends to prevent the presentation and denies the adequate consideration of grievances and tends to increase the number of shop offenses and the amount of docking and fining; it introduces the spirit of mutual suspicion and contest among the men and thus destroys the solidarity and co-operative spirit of the group; it has refused to deal with the workers except as individuals; it is incompatible with and destructive to unionism; it destroys all the protective rules established by unionism; and, finally, it is incompatible with and destructive to collective bargaining.
>
> Industrial democracy, as we understand it, is that condition in the industries which acknowledges and accepts the right of labor to a collective voice in determining what the terms of employment shall be, and the conditions under which labor is to be performed. It gives practical application to the principle that government in the shop, like government in the nation, should be by the consent of the governed."

The term "Welfare Work" is distasteful to the worker. It never should have been applied to the functions implied. The welfare of the worker is an inherent principle of true scientific management. Not long ago a friend of mine was discussing welfare work in a large department store in the middle west. He was endeavoring to interest the owner in a program through which a more permanent and harmonious personnel could be developed. After listening to my friend for some time, he suddenly leaped to his feet and exclaimed: "Welfare work! welfare work! What is this welfare work? I want business." Need we wonder that the worker at times appears to be shortsighted when we have such examples of utter disregard of the elementary principles of business necessity?

At the close of the last session of Congress an amendment to the Army Appropriation Bill was introduced and passed, providing that no moneys therein appropriated were to be expended in the payment of "premium" or in wages or salaries for "time-study" men. This bill was engineered through under the direction of Mr. Deitrick of Massachussetts, and Mr. Buchanan of Illinois. This piece of legislation was designed to "throw scientific management out of government shops." The writer of this paper was opposed to this legislation. He was opposed to it because, in his opinion it did not represent the will of the worker, and did not in any way settle the problem. Having been retained by 235 workers employed at Watertown Arsenal to make a study of their complaints, and prepare a brief in their behalf directed to the Secretary of War, and having made such study covering eleven months, and involving an expenditure of something like $2,000 out of his own pocket, the writer felt that he was in a position to know what the real complaints of the worker were and how they could be satisfactorily adjusted. The great mass of information provided me by the workers at Watertown Arsenal, coupled with the very competent and helpful advice of the Workers' Committee at that plant, had gained me a very intimate knowledge of the contentions of the worker and the position maintained by the management. Constructive legislation was necessary, but legislation in the form of the Deitrick amendment was beside the question. I found that many of the complaints of the workers were entirely justified. The workers had repeatedly tried to obtain remedy through regular channels but failed to accomplish even an approximation of their wants. I opposed the amendment to the Army Appropriation Bill for the following reasons:

First: It settled nothing, either as regards to labor, management or the government.

Second: It did not represent the will of the workers.

Third: It attempted to settle a problem of management through political action.

Fourth: It represented one of those superficial expedients so often utilized by organized labor to settle an economic and sociological problem.

If the Deitrick amendment was meant to be a protest, and merely a protest, against the conditions obtaining at Watertown Arsenal, and the total ignoring of the complaints and petitions of the worker, the writer has no particular objection. If the amendment, however, was intended to form the foundation for a national propoganda against the efficiency movement, and scientific management in general, the writer is utterly opposed to it.

It has been a favorite idea of the writer for a very long time, that organized labor should employ expert service in the same manner and in the same function as that employed by the employer. Science should be fought with science. The real facts should be obtained and arranged and analyzed in scientific form. Political expediences and brute force will not, and cannot, bring to labor its fullest share of social welfare: I undertook the Watertown Arsenal work because of this ideal. My work was looked upon with suspicion by the officials of organized labor. I was supposed to be carrying out some new scheme to entrap labor. Notwithstanding the fact that I had been authorized by the workers at Watertown Arsenal to represent them in all legislative matters, the officials of organized labor in Washington failed to notify me of the impending legislation, or in any way solicit my co-operation, experience or sympathy. Personal equations dealing with individual aspirations controlled the sentiments and actions of these officials. I do not condemn them. I merely assert that the great ends to be sought by organized labor cannot, and will not be gained, through efforts to add a feather to the cap of a particular official.

The same question is coming up again before the present Congress. It will take shape in some form of legislation. The writer trusts that organized labor will look toward constructive legislation, leading to a real settlement of these problems of industrial management. I have every reason to believe that organized labor is not opposed to the principles of efficiency. If they are opposed to so-called scientific management, it is our duty to make a careful study of the problem, and make such changes and adjustments as will make scientific management a reality.

The aim of this paper is to bring out the underlying contention of the worker in relation to the efficiency program. For the sake of clearness I have divided the discussion into four distinct parts, and utilized my study of scientific management at Watertown Arsenal as an illustration.

I The management's position.

II The workers' contentions.

III The attitude of organized labor, and

IV The opinion of counsel.*

The Management's Position.

The following quotations show the position of the management.

"The system has continued to operate well at the Watertown Arsenal." (Report of the Chief of Ordnance for 1913, p. 12.)

"* * * With the extension of the system, the advantages have continued and increased." (Report of the Chief of Ordnance for 1914, p. 13.)

"The increased output is accompanied by an increase, and a very substantial increase in the pay. And no rate is set which requires heart breaking exertion or exertion of a character which is not agreeable, in order to increase the wages theretofore received * * *. All of the men are informed of the system in practice at the Arsenal, and all give their consent to it by being taken on." (Report, 1913, Appendix I, p. 62.)

"Anything that produced permanent dissatisfaction and discontent would be given up. We desire to have our relations with the workmen harmonious."

"These expressions should not be misinterpreted. They do not mean that any feature deemed beneficial will be given up immediately upon the request of employees, without investigation of the grounds and reasons for such a request. Before the abandonment of a feature is decided upon it must be demonstrated that those objecting to it have worked under it long enough to understand it thoroughly, that their objections are material and based upon their own experience rather than the suggestions of others, and that they represent in number more than the small discontented element that exists in all industrial organizations."

"The time study affords the most accurate measure yet devised for determining the just quantity of work that should be performed without over exertion, and the premium system is one of the means by which this just quantity of work can be adequately paid for." (Ibid., pp. 81, 82. Testimony of Gen. Crozier before Congressional Committee, 1912.)

Mr. Deitrick: I understood you to say, General, that the men at the Watertown Arsenal were satisfied to work under the Taylor System.

Gen. Crozier: I do not say that. I say that the evidence in the shop is that it is satisfactory, in spite of the evidence the other way. Here is this petition signed by 300 men. If I had more time, I would like to deal with that in some detail. A great deal can be said about that petition. The fact that these men signed this petition is not conclusive at all. On the face of it, the conclusion is that they are dissatisfied.

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*The writer was retained as counsel by a large number of workers at Watertown Arsenal, to prepare a petition to the Secretary of War in their behalf, presenting their complaints and contentions in relation to the Taylor System in operation at Watertown Arsenal, Watertown, Mass.

Mr. Deitrick: If it should appear that a majority of the men in each department of the Watertown Arsenal signed a statement against the Taylor System, would that lead you to believe that the men were dissatisfied?

Gen. Crozier: Some of these men told the management that they signed this statement against their will.

Mr. Deitrick: I am not talking about this particular statement. I am talking about something new. If the majority of the men in each department voluntarily signed a statement protesting against the Taylor System, would that change your view as to whether or not the men were satisfied with the system?

Gen Crozier: It would have a considerable effect, but I would have to be convinced that they did it voluntarily.*

The Workers' Contentions.

The following extract is taken from the Petition and Brief prepared by the writer in behalf of the workers at Watertown Arsenal (pages 51-52):

From 1909 to 1911 the systemization of the Watertown Arsenal took place. In 1911 began the introduction of the second part of the Taylor System, the stimulation of the workmen. Then began their discontent.

After two years of futile endeavor to have the system abolished or modified, some of the workmen were advised to see Mr. Chipman. They did so and retained him to act as their counsel.

For the first time in the history of scientific management, an exponent of that science was retained by workmen to investigate the conditions surrounding their employment.

Mr. Chipman agreed to act in this capacity and without fee, but stated positively that he would take no steps in the matter until he had in his hands signed papers from more than a majority of the employees in the departments affected, stating that they were opposed to the Taylor System and individually impowering him to act as their counsel.

To obtain this information, a list of questions was drawn up and with a blank for the formal authorization of Mr. Chipman to act as the individual counsel for the signer were mailed on January 19, 1914, to the house address of each employee, that he might answer the questions at home and free from outside influences; 235 replied; 214 were opposed to the Taylor System; 221 authorized him to act as their counsel. The answers to the questions were tabulated and the results are shown on the tabulation sheets.

The steps taken included:

The question sheet,
The accompanying letter,
The numbered return envelope,
The record of numbers and corresponding code numbers,
The tabulations sheets,
The tabulations,
The authorizations,
The statements and letters of the men,
Copies of the same with code numbers in place of names,
The summary of answers,
The conclusions drawn from them.

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*Hearings before the House Committee on Labor, H. R. 8662, "The Stop Watch and Bonus System in Government Work," p. 84.

In order to obtain voluntary expressions of the feelings of the individual employees in regard to the operation of the Taylor System at the Watertown Arsenal, 342 question sheets were sent out to the individual employees, and replies were received from 242, or 70.8% of those questioned; 7, or 2%, were returned without answer; leaving 235, or 68.7%, who answered the questions.

It was reported verbally that many others were opposed to the system, but dared not answer the question or even say much about the system for fear of getting into trouble with the management and losing their jobs.

There is evidence of deep-rooted objection to the system in the fact that so large a number, 221, or 94%, of the 235 men who replied, signed the letter authorizing Miner Chipman to act as their Counsel in the matter of their "petition for the abolishment or change of the Taylor System of Shop Management in operation at the Arsenal of the United States Government, located at Watertown, Massachusetts. Fourteen men, or 6%, answered questions, but did not sign the authorization.

The replies come from men in twelve different departments, the largest numbers from men most affected by the Time Study and Premium features of the Taylor System, being in departments where these features have been longest in operation. Of the 214 men opposed to the Taylor System, 137, or 64%, are in the machine shop and erecting room; 12.2% are in the yard; 6.1% are in the blacksmith shop, 4.7% are in the foundry.

An analysis of the answers to the question about their age shows that the "opposed" are the great body of men in their prime and that they are on an average younger than those "not opposed," by one year and five months, the figures being:

211 men (90.2% of all replying) average age..............40.2 yrs.
193 men (90.2% of all, 215 opposed), average age..........40.4 yrs.
14 men (of the 16 not opposed), average age..............41.9 yrs.
4 men (of the 5 not answering), average age............30.3 yrs.

Two hundred and eleven answered the questions as to marriage, of whom 159, or 75.4% were married and 52 or 24.6% not married.

Of the 159 married men, 143, or 89.9%, are opposed, and 14, or 8.8%, are not opposed.

One hundred and twenty-five of the married men report having children, their total number being 379, an average of a little over three children per man.

The 112 married men who are opposed to the Taylor System have 327 children, an average of 2.9 children per man, while the 11 married men who are "not opposed" have 49 children, an average of 4.4 children per man.

We have made a tabulation showing that of those "opposed," 14 have each from 5 to 12 children, 23 have each 4 children, 18 have each 3 children, 30 have each 2 children, and 27 have each 1 child.

Of those opposed to the Taylor System, there are:

214 men.
110 wives.
327 children, making a total of
———
651 persons whose living conditions it affects.

In regard to the number of years which each man has been employed at the Watertown Arsenal, 218, or 92.8%, of all replying answer that they have worked there a total of 1,417 5/12 years, an average of 6.5 years per man. Of those, 200, or 91.8%, who are "opposed" to the Taylor System, have worked there 1,293 9/12 years, an average of 6.47 years per man; 15, or 6.8%, who are "not opposed," have worked there 107 6/12 years, an average of 7.17 years per man; and 3 men, or 1.4% who "do not answer as to the Taylor System," have worked there 16 2/12 years, an average of 5.39 years. This shows that those "opposed" are 91.8% of the total number and have worked there 91.3% of the total years; those "not opposed" are 6.8% of the total number and have worked there 7.6% of the total years; and those who "do not answer as to the Taylor System" are 1.4% of the total number and have worked there 1.1% of the total years. Both the average years per man and the percentage of years worked there show that those "opposed" have been working there a slightly shorter time than those "not opposed," but longer than those who "do not answer as to Taylor System."

It has been claimed for years by the Ordnance Department that it was the Union men who were opposed to the Taylor System and who fomented agitation against it at the Watertown Arsenal. The answers to the question sheet show the opposite.

A majority of those "opposed" to the Taylor System at the Watertown Arsenal are non-union men.

The exact figures of 214 "opposed" are: 113, or 52.8%, are non-union; and 101, or 47.2%, are union men. Of the 16 "not opposed," 11 are non-union men and 5 are union men. The answers to Question 11: "Do you think the agitation is brought about through Union labor or similar sources?" show 137 answering "No," 28 answering "Yes," and 70 giving no answer. This is what the men themselves know to be true and they are in a better position to know the truth than anyone else.

In his report to the Secretary of War for 1913, Appendix I, page 70, General Crozier, Chief of Ordnance, says:

> "I think the petitions are due to the coercion and the teachings of labor organizations."

In this speech before the Boston Efficiency Club Branch February 11, 1914, he said:

> "I have tried oftentimes to ascertain whether these men are satisfied. It is not easy to find out. I have talked with some of them, and I have been told that they are very well satisfied. I have been told by others that they are not. The labor organizations do not like the system. There are some reasons why we can see that they might not like it. Labor organizations have always fought anything that increased the productivity of the individual. They commenced years ago by fighting labor-saving machinery. They do not now oppose the introduction of that kind of machinery as such, but they oppose these labor saving methods. One reason, I fancy, is that there is a belief that there is only a certain amount of work to go round and that if it is done by a smaller number of men some men will lose their jobs."*

That those "opposed" are of higher daily wage rating than those "not opposed" is shown by an analysis of the daily wages of those answering, which shows:

203 men "opposed," average daily wage, $2.79.
15 men "not opposed," average daily wage, $2.53.
4 men "who do not answer as to Taylor System," average daily wage, $1.84.

Of the 134 men working on premium in the machine shop, 124 who are "opposed" receive an average daily wage of $2.91; 10 "not opposed" receive an average daily wage of $2.72, or nineteen cents per day less than those "opposed." Of the 92 having a daily wage rate of $3.04 or more, 86 or 93.5 per cent are "opposed" and 6 or 6.5 per cent are "not opposed."

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*Greater Efficiency, March, 1914, p. 19.

We now take up the numbered questions, the first of which is: "Are you opposed to the Taylor System of management as in operation at the Watertown Arsenal?"

It should be noted that this question is specific, not general; it applies only to the operation of this system at the Watertown Arsenal and the other questions which follow are equally specific. Of the 235 replying, 214, or 91.1%, are "opposed"; 16, or 6.8%, are "not opposed"; and 5, or 2.1%, do not answer this question.

An overwhelming majority are opposed to the Taylor System. Those not opposed or who do not answer are so few as to be negligible.

The 214 who are "opposed to the Taylor System" are 62.5%, of the 342 to whom the question sheet was sent, which shows that a large majority, in fact, if those who feared to answer the questions had answered them, it would have shown that practically all working under the Taylor System were opposed to it.

Of the 159 married men, 143, or 90%, are "opposed"; 14, or 8.8%, are "not opposed"; and 2, or 1.2%, "do not answer as to Taylor System." Of the 52 unmarried men 50, or 96.2% are "opposed"; and none are "not opposed"; 2 do not answer the question.

Eighty-six per cent of all replying work in departments having time study and premium features in operation and 85.5% of the 214 "opposed" are so working. The others have seen around them the daily working of the system and its effect on others and oppose it.

Ninety-three and one-tenth per cent of those answering this question are opposed to the time study method, only 5.9% favoring it.

One hundred and fifty-one, or 70.6% of those "opposed," are working on premium and are earning it each month; 150, or 70.1% of those "opposed" say they accept the premium. Many do not answer. Some are caustic in their replies, mainly to the effect that they must accept the premium or be disciplined, perhaps discharged.

The status of those "opposed to the Taylor System" may be summarized as follows:

214 are "opposed."
Of these:
193 (90.2%) have an average age of 40.2 years.
143 are married; 50 are not.
112 have children, in all 327, an average of 2.9 per man.
200 have worked at the Arsenal an average of 6.47 years per man.
113 or 52.8% are non-union men.

The average wage rate of those "opposed" is 21 cents per day more than that of those "not opposed."

The status of those working in departments where the time study and premium features are in operation is as follows:

202 work in such departments.
Of these:
183, or 90.6%, are "opposed to the Taylor System."
182, or 90.2%, are opposed to time study.
140, or 69.3%, tell why they are opposed to time study.
169, or 83.7%, are working on premium.
154, or 76.2%, tell why they are opposed to premium.
84, or 41.6%, have been unjustly treated.
82, or 40.6%, state how they have been unjustly treated.
146, or 72.3%, have been time studied.

The Attitude of Organized Labor.

It may be said with authority that organized labor is opposed to scientific management in practice. The basic reason for this opposition rests in the primary definition of efficiency. Organized labor is opposed to scientific management because scientific management in practice is believed to be prejudicial to the principles and ideals of the working class. I shall not discuss the righteousness of the contention of organized labor, but merely desire to present the cold bare fact that organized labor, as a social force, is utterly opposed to the efficiency program as exemplified by scientific management.

> The Hoxie report says: "Scientific management would seem to offer possibilities ultimately of better market control or better adaptation to market conditions, but the experience of the past year of depression indicates that at present no such possibilities generally exist.
>
> "Finally, until unionism as it exists has been done away with or has undergone essential modification, 'Scientific Management' cannot be said to make for the avoidance of strikes, and the establishment of industrial peace. Mr. Taylor's statement that no strike has ever occurred under 'Scientific Management' means simply that if a strike accurs, 'Scientific Management,' in Mr. Taylor's conception of it, does not exist. Your investigator has discovered several well authenticated cases of strikes which have occurred in 'Scientific Management' shops. He is inclined to believe that they are less frequent in this class of shops than elsewhere in similar establishments, owing largely to the fact that organized workmen are on the whole little employed. In its extension, however, it is certain that 'Scientific Management' is a constant menace to industrial peace. So long as present day unionism exists, and unionists continue to believe as they seem warranted in doing, that 'Scientific Management' means the destruction of their organizations or their present rules and regulations, unionism will continue to oppose it energetically and whenever and wherever opportunity affords."

A very thorough outline of the contentions of organized labor will be found in Prof. Hoxie's book, Scientific Management and Labor.

Opinion of Counsel.

Scientific management in practice lacks three things of fundamental importance:

First: An adequate method of industrial education.
Second: An adequate recognition of the principles of democracy in industry.
Third: An adequate conception of, and sympathy with, the sociological and economic aspirations of the worker.

Industrial Education.

In the opinion of counsel, the first and primary principle of scientific management should be that of industrial education. I do not mean the industrial education accepted in the ordinary sense. I mean education for efficiency. I mean education for the broadest possible sphere of usefulness. Industrial education in connection with scientific management must mean more than a blue-printed instruction card. The breaking up of crafts under scientific management is also breaking up certain of our social formations. Industrial education must be more than the mere training for a particular piece of intensive productive work. It must give the worker an adequate conception of his place in the whole process of manufacture. It must not stop with apprenticeship training. It must go on with an ever broadening scope. Industrial education is directly connected with scientific management. It should be made a part of it.

Industrial Education.

It may safely be put forward as a principle that the day has passed when we can impose upon men, without their consent or understanding, any system, device or method affecting their work, life and standard of living. Industrial democracy is not political democracy. It represents the right of the worker to express an intelligent opinion, and have a voice in the management of affairs in which he is vitally concerned. The principle of political democracy is founded upon the right to have a voice, industrial democracy is founded upon the intelligence and competency necessary to properly express that voice. Industrial democracy can only come through intelligent co-operation between employer and employee. It should be a function of scientific management to work out means and methods for such co-operation. Industrial education is the first and most important step looking toward industrial democracy, and industrial efficiency.

Organized Labor.

Organized labor represents, in a recognized form, certain very clearly defined ideals of the working class. It is representative of that great mass of unvoiced sentiment throughout the world of labor. Organized labor is a definite thing. It exists. It exists as it is. It is not for scientific management to build up Utopian conditions, wherein organized labor would be unnecessary. Organized labor IS. It is our job to take it as it is, not as it ought to be, and work out, slowly if necessary, the conflicting ideals that separate employer and employee. It is a practical task. It is much more difficult than the standardization of machine parts, or the cultivation of the art of cutting metals. There are many who would like to destroy organized labor with one sweep of the hand—but organized labor will not thus be swept away. We must realize that the ideals of organized labor are not primarily those of mere production efficiency. Back of trade unionism there stands the structure of the home, the family and social ties. Organized labor is not primarily interested in productive efficiency. Viewed by itself, alone, and distinct from other considerations, productiveness and MERE EFFICIENCY are side issues. Efficiency for what? That is the eternal question of the worker. When he is shown that it is for the permanent benefit of himself, his home, and the social sphere in which he lives, efficiency becomes a living, lasting thing, a part and parcel of the principles of trade unionism. Not until then. I believe that the efficiency movement, and scientific management, as a step toward a better industrial day, holds within it the machinery through which labor may profitably co-operate. They will not co-operate, however, without democratic principles of management, and an adequate system of industrial education.

Stop-watch and Premium.

In my study of conditions at Watertown Arsenal I discovered that the attack of the workers was centered upon the stop-watch-premium features of the Taylor System of management. A superficial examination of their complaints would lead one to believe that the worker was opposed to the stop-watch method, becauses of the method itself, and opposed to the premium method of wage payment, because of the premium method itself. But this is not the case. After careful study of over two hundred statements, written by as many men employed by the government, and working under the system at Watertown Arsenal, I found that the fundamental ground for complaint was not time-study or premium. Throughout these statements it was made clear that the objection to these devices of scientific management was based upon the method of introduction and administration, and not upon the devices themselves. An absolute lack of the democratic spirit prevailed throughout the introduction of the system, and still prevails. Stop-watch and premium were taken as the targets for attack because they were considered to be the brain and heart of the system. Kill them and the thing would die. This is interesting. If scientific management depends upon the stop-watch method of observation, and upon the premium features of wage payment, then scientific management should die. The fact is, however, that I have found that the stop-watch method of time-study is not objected to by workers, and even union workers, where principles of industrial democracy are taken into consideration, and an educative process developed to meet the requirements of the situation. The failure of scientific management at Watertown Arsenal in so far as gaining the consent of the worker is concerned may be attributed to the lack of means and methods of democratic co-operation, and an adequate educative process.

The fight against scientific management at Watertown Arsenal is, in reality, a fight against its arbitrary and dictatorial approach to the human problem. I believe that no one will question the absolute good faith of Brig. Gen. William Crozier, Chief of Ordnance, in introducing and maintaining the system at Watertown Arsenal. Organized labor has taken a militant stand against the system as a whole because it has not taken into consideration principles and formulas of human welfare as well as principles and formulas of productive efficiency. The President of the International Association of Machinists, in Circular Number 12, addressed to the members of that association on April 26, 1911, said:

> "* * * The latest danger, and the one we propose to deal with in this letter, is the so-called Taylor system of shop management. * * * The installation of the Taylor system throughout the country means one of two things, i. e., either the machinists will succeed in destroying the usefulness of this system through resistance, or it will mean the wiping out of our trade and organization with the accompanying low wages, life-destroying hard work, long hours, and intolerable conditions generally."

The Deitrick amendment to the Army appropriation bill is the result of this appeal. It shows the determined attitude of organized labor toward scientific management, and the Taylor System in particular.

Suggested Remedies.

Counsel makes the following recommendations for the consideration of employer and employee, organized and unorganized labor:

First: That scientific management shall include within its code of principles an adequate system of industrial education.

That this education process shall include a course of study in the principles of management, and the underlying principles of time-study, routing, etc., etc.

Second: That no time-study be made covering the operation of any worker without his consent.

Third: That no premium or other bonus system be introduced without the consent of the workers.

Fourth: That an adequate system of representation be established as a basis of co-operation between employer and employee.

These recommendations in more detail involve:

(1) If the time-study is right, if the method is right, if the time-study man is right, and if the worker knows the meaning and object of the time-study, and co-operates in taking it, then:

The consent of the worker to a standard time, or piece-work schedule, is obtainable upon an intelligent basis.

(2) It should be a principle of scientific management that no time-study shall be accepted as the basis for standard time, or piece-work schedule, until the same has been approved by the worker, or a committee of workers.

(3) The method of approving or disapproving a time-study shall be upon the pre-determined factors of proper time-study, and not upon the basis of guess-work or prejudice.

I can see no reason why the exponents of scientific management should complain against this principle. If they have faith in the righteousness of the principle of the time-study, they should be willing to submit it for open consideration to the man.

(4) In all cases, consideration of a time-study must be upon the basis of fact and not upon fancy or mere contention. In case of contention however, the time-study should not be forced into the piece-work schedule, but the educative process be developed to a point where the consideration of the time-study becomes an equitable one.

(5) The workers in each department should elect, or employ, a committee of practical men, with knowledge of time-study and the general application of scientific management, and these men should supervise, in co-operation with the management, the taking and application of time-study data.

(6) Premium or bonus methods should not be introduced without the understanding and consent of the worker.

(7) If efficiency rewards, or premium methods of wage payment are introduced, it is seriously recommended that the basis of payment be average long time service, and not a job basis of measurement.

In the opinion of counsel the methods of premium and bonus in usual operation are fundamentally opposed to good social practice. Labor is endeavoring to get away from the near incentives of the piece-rate system. Efficiency can be measured in the term of months or years as easily as in terms of days or hours. A serious complaint of the workers at Watertown Arsenal lies in the tremendous variation in piece-work earnings under the premium system from job to job. The worker does not like this variation, and does not like the measurement of his efficiency within the narrow limits of a single job.

Counsel is of the opinion that the workers at Watertown Arsenal are justified in their complaints against the system, and that immediate remedy should be given. It is not a question of the Taylor System or any other system, it is a question of scientific management in the true sense of the word. Taken upon its face value my study of scientific management at Watertown Arsenal thoroughly condemns the system as in operation. In the opinion of counsel the system in operation is not either the Taylor System or scientific management according to the principles of Frederick W. Taylor. The whole question is confused by variations in the definition of terms, misunderstanding of motives and lack of any basis for adequate co-operation.

Legislation.

If legislative measures are to be proposed to Congress in relation to scientific management in government shops, counsel would make this final recommendation:

First: That a committee representing the workers be elected at Watertown Arsenal, and other government shops. That this committee be authorized to employ experts in the problems of management, to represent them and the workers.

Second: That the management of the government shops appoint a committee to co-operate with the workers' committee.

Third: That the Secretary of War appoint, or employ such expert counsel as may be deemed necessary to co-operate with the management of government shops and the workers' committees.

Fourth: That the American Federation of Labor be asked to appoint a committee, representing that organization, to co-operate with the foregoing committees.

Fifth: That these committees meet in conference and make an earnest endeavor to frame up an adequate program of action looking toward a satisfactory efficiency basis of government manufacturing processes.

Sixth: That such committee report to the Secretary of War, and to the Congress of the United States, such recommendations and plans of procedure as may be found advisable.

EFFICIENCY SOCIETY FEB.-4

Scientific Management and Labor (Frey)

2-21-16

This is the third of a series of bulletins giving the views of various interested parties on this problem. The author, John P. Frey, editor of International Moulders' Journal, is the recognized spokesman of organized labor, having served as its representative on the Hoxie commission.

A few years ago there was introduced in several industrial establishments a system of management which was radically different in many of its features from any that had preceded it, and which its advocates announced was revolutionary in its results. The system was called *scientific management.*

Scientific Management on Trial.

Claiming that the system had been developed as the result of thoroughgoing and scientific research and investigation by highly trained industrial and mechanical experts, its advocates held that when applied to industry it would eliminate economic waste by systematizing and standardizing the elements of production. It was asserted that it would make the workers more efficient through the special instructions and training it provided for, that it would safeguard them from injustice and the arbitrariness of employers and foremen, protect them from over-exertion and provide for higher wages than had previously been paid, and furthermore, that it would eliminate industrial strife.

Owing to its application in part in government arsenals, and a strike by the union molders against some of its features as they were introduced in the foundry at the Watertown arsenal, scientific management received much publicity.

The House of Representatives appointed a committee, consisting of Congressmen William B. Wilson, William C. Redfield and John Q. Tilson, to investigate the system as it had been applied in the Watertown arsenal. In its report to Congress this committee sustained labor's contention that the system forced abnormally high speed upon workmen, that its disciplinary features were arbitrary and harsh, and that the use of a stop watch and the payment of a bonus were injurious to the workers' manhood and welfare. At a succeeding session of Congress a measure was passed which prohibited the further use of the stop watch and the payment of a premium or bonus to workmen in government establishments.

When the Federal Commission on Industrial Relations began its work it was decided that a further investigation of scientific management should be made, and Robert F. Hoxie, professor of economics at the University of Chicago, was selected to undertake the work. The commission was fortunate in securing a man of Mr. Hoxie's caliber and training. For many years he had made a specialty of industrial problems, and was familiar through personal contact and association with the viewpoint, mental attitude and ideals of employers and workmen, organized and unorganized. Throughout the investigation he was treading on familiar ground, in so far as the principal problems which have arisen in our industries between the workers and the employers were concerned.

Mr. Hoxie was to devote a year to his investigation, and, as a part of this was to include a personal examination of a number of industrial plants which had applied the methods and principles of scientific management, it was deemed advisable that he should be accompanied by two men whose training qualified them to act as expert assistants in calling attention to the actual conditions which would be encountered in these establishments, and their implications.

One of those appointed was Robert G. Valentine, ex-Indian commissioner, and by profession an industrial counsellor, who, during recent years, had devoted most of his time to the development of the personal features in large establishments. The question of Mr. Valentine's selection was referred to some of the leaders of scientific management before his appointment was confirmed by the Commission on Industrial Relations.

The other expert was to be a trade-unionist, and I was honored with the appointment.

The Hoxie Report.

The report which Mr. Hoxie submitted to the Commission on Industrial Relations was prepared after some thirty-five industrial establishments had been investigated, and interviews had been held with a much larger number of individuals connected with the management side, including such readers of the scientific management systems as Frederick W. Taylor, Harrington Emerson and H. L. Gantt. Workers, organized and unorganized, and trade union officials were also questioned.

In connection with this report it should be said that from the day that the chief investigator and his two assistants met to take up the field work there were daily conferences whenever they had jointly visited a plant, at which all information secured was discussed, and an earnest effort made to give the proper weight and value to the sometimes conflicting statements of workers and employers which were secured in the establishments investigated.

The investigators were impressed with the conviction that their work was not to compare one theory of management with another, or to investigate the theoretical postulates of scientific management, but rather to discover the actual conditions affecting labor which existed in industrial establishments where the system was being applied and in operation. It was an investigation of scientific management as it affected labor directly and indirectly.

The report which was finally prepared by Mr. Hoxie, after consultation with his two assistants, was subjected to their criticisms and suggestions, until finally a common agreement was reached, so that when it was presented to the Commission on Industrial Relations it had attached the signatures of the three, who were in agreement with its contents.

It is necessary, before referring to the facts which were developed by the investigation, to indicate the preliminary work which was done by Mr. Hoxie previous to the field investigations, for the lines along which the investigation was carried on were determined almost wholly by the results of this preliminary determination of the points upon which it was necessary to secure information.

From the day that scientific management was given publicity, positive claims as to its great value to labor were made by its advocates, while as emphatic charges that its methods and practices were injurious to the workers were made by trade unionists. Some of these statements were contained in books, magazine articles and public addresses, while many of them were incorporated in the Congressional hearings which had been held, and the testimony given before the Commission on Industrial Relations in the early part of 1914.

These records were examined and from them approximately one hundred separate features of scientific management were secured, which its leading advocates claimed were beneficial to labor. Practically an equal number of separate charges were made by trade unionists against the system. This examination of the record, supplemented by personal interviews with leaders of both groups, supplied two lists, one containing the labor claims of scientific management and the other the charges against it made by the trade unions.

Such lists, however, were liable to have their accuracy challenged, and to prevent such an issue from being raised afterwards they were submitted to high authority for revision and correction.

The list of the labor claims of scientific management was submitted to Mr. Taylor, Mr. Emerson and Mr. Gantt and others, and as the Taylor and Emerson systems differ in some respects, their respective modifications or statements were separately recorded. The final result, however, was a list of the labor claims of scientific management which had the stamp of accuracy and completeness placed upon it by the recognized leaders of the cult.

The list of labor's charges against scientific management was brought to the attention of the executive council of the American Federation of Labor by Mr. Hoxie during the Philadelphia convention of that organization in 1914, with the request that a committee should be appointed to examine the list, with the object of making such modifications, additions or corrections as would be necessary to have it embody the trade union viewpoint. A committee was appointed for this purpose, and afterwards the list of labor's charges was carefully gone over by President Gompers, First Vice President Duncan and Secretary Morrison. This list contained some charges which had been made by individuals, with perhaps insufficient evidence to prove their accuracy, but inasmuch as they had been made publicly they were allowed to stand.

There were, therefore, two lists of statements, both of which had been given the highest endorsement as to their accuracy which it was possible to obtain. With these two lists before him Mr. Hoxie prepared a list of the vital points of difference between them.

It was apparent that if the facts were to be acquired, detailed instead of general information would have to be secured, and that this might be systematically gathered a questionnaire was prepared, containing approximately seven hundred questions, the great majority so framed as to call for detailed information, and few permitting of a simple affirmative or negative answer. The questionnaire formed the foundation of the investigation, this being supplemented by the material gathered through personal investigations of plants where production under scientific management was being carried on.

Mr. Valentine and I assisted Mr. Hoxie in the final revision of the questionnaire, and when had left the printer's hand the field work was undertaken, with the object of securing such evidence as could be found which would justify either the labor claims made for scientific management or the charges made against it.

The plants where the investigations were made were representative establishments or those recommended or suggested by Mr. Taylor, Mr. Gantt or Mr. Emerson as those in which the standard methods of scientific management had been applied. These shops, therefore, afforded the most satisfactory field for studying scientific management at its best which could be secured. The plants visited covered a wide range of production, from cloth weaving, garment making and the manufacture of large machinery to printing establishments, shops operated largely by semi-automatic and automatic machinery, departments where hand labor rather than machinery was required, and a government arsenal.

Many Kinds of Scientific Management.

The item *scientific management* was originally applied to the system of shop management which had been developed by Frederick W. Taylor. At present it is popularly used to designate any one of the several systems of shop management which embody in part certain of the prominent features which were first introduced by Mr. Taylor.

While all of the systems of scientific management have certain features in common, they also contain elements of difference, both as to their structure and the method of their application. It is, therefore, difficult to define scientific management in a manner which would satisfy all of the leaders of the several systems now in operation; for all general purposes it may be said that the term designates any of the systems of shop management which claim to secure greater productive efficiency through the systematic standardization of the elements of production.

A common feature of these systems is the planning out of the work by specialists so that it may be most economically handled and routed through the shop, the grouping of machinery and its operation at full capacity, the time and motion study of all mechanical and manual movements, so that the machines' possibilities and the workers' manual capacity can be analyzed into their minute elements from which the task to be accomplished can be defined and fixed, and the stimulation of the worker through the payment of a bonus or premium, so that the task set will be accomplished.

No Complete Systems Exist.

The investigation which was made indicated that no plant had as yet applied all of the features of any of the systems to the establishment as a whole, and that practically every employer had made modifications of whatever part of the system had been introduced.

To illustrate the divergence found, the forms of wage payments may be taken. Originally there were three most prominently known, the premium, the task and bonus and the differential piece work. These may be termed basic forms, but some twenty-five or more variations of these were found to be in practice. Wide variations were also found in the manner of making time studies, and in the rules by which the worker's task was to be determined. It was also found that the same system, installed by the same efficiency engineer, would produce varying results in different plants, as far as the workers were concerned, each general manager modifying or altering the application of the system according to his temperament, viewpoint and his knowledge of the human problems created by modern industry.

Only Standard Systems Examined.

The several systems of scientific management and their variations which were observed in actual operation were installed by efficiency experts or managers, whose names are prominent in the scientific management group, and no time was devoted to an examination of shops where systems had been installed by any of the charlatans and fakers who, during recent years, have reaped a rich harvest, owing to the employers' avariciousness or credulity. We were informed by the leaders in the established scientific management group that the number of charlatans and imposters far outnumbered those who were truly qualified as efficiency engineers and had secured a recognized standing among business men. These quacks, they held, were largely responsible for much of the disrepute in which scientific management is held by many employers and workers. Referring to them one eminent efficiency engineer said:

> At the present time there is a great dearth of men who are qualified by experience, training and temperament to establish in industry the principles of scientific management and to develop a proper mechanism for the application of these principles. There are also some of these men who are perfectly sincere and honest in their efforts and do not realize their shortcomings or lack of qualifications. Others have regarded so-called efficiency engineering as a means of earning an easier living and making more money than they would otherwise be able to do in other fields.

Another equally as well known efficiency engineer said:

> One trouble is that there are a larger number of fakers installing systems under the guise of scientific management and it is because of what they have done that workmen have just cause for complaint.

One expert informed us that "there were more fake engineers in scientific management than in any other line," while one of the most prominent leaders said that the reason the competent efficiency experts had not succeeded in exposing all of the fakers and imposters was that these quacks outnumbered them five to one.

System Fakers Innumerable.

No effort was made to discover how many fakers there were professing to introduce scientific management, but from the statements made to us it would seem that there are a large number. Upon this subject the Hoxie report says:

> Scientific management as a movement is cursed with fakers. The great rewards which a few leaders in the movement have secured for their services have brought into the field a crowd of industrial patent medicine men. The way is open to all. No standards or requirements, private or public, have been developed by the application of which the goats can be separated from the sheep. Employers have thus far proved credulous. Almost any one can show the average manufacturing concern where it can make some improvements in its methods. So the scientific management shingles have gone up all over the country, the fakers have gone into the shops, and in the name of scientific management have reaped temporary gains to the detriment of the real article, the employers and the workers.
>
> Just who these fake scientific management experts and time study men are, it is impossible to tell, since no recognized standards of judgment exist. Accusations, indeed, are plentiful, but your investigator would not be warranted in repeating these. What proportion of the numerous failures of so-called scientific management, of the positive errors and evils of time study, task setting and rate making in shops under this name are due to the work of these fakers is another matter on which no judgment can be passed. though scientific managers have variously estimated the fakers as four out of five, or nine out of ten. The certainty is that this element exists; that its representatives apparently cannot be clearly distinguished and set off under existing circumstances from the more legitimate scientific management practitioners; that the legitimate scientific management group seems powerless to eliminate or control it; and that it exposes employers and workers to the losses and injustices of crude and inaccurate industrial tinkering—all in the name of scientific management and under the protection of its promises and claims.

The quacks' work, however, was not investigated. The facts which were gathered, the impressions which were secured, and the tendencies which were observed were all acquired through the investigation of plants in which scientific management had been introduced by well known efficiency experts or managers.

The methods of introducing the systems varied according to the men, some going about their work in a diplomatic manner, others jamming it through with apparently little, if any, regard for the workers.

The president of one of the largest establishments told us that ———'s system of scientific management was without human element, and that the trade unionists were not to be blamed for fighting it because of the language which he had used in connection with labor. "If," he said, "I had introduced scientific management in the literal way in which ——— interprets it, I would have a revolution on my hands, and the workmen would have been no good if they had not revolted."

From information secured it would appear that scientific management in its genesis gave but little, if any, consideration to the workers' rights and welfare, but confined itself closely to the problem of reducing the cost of production. When the system was first established it was largely applied to plants which had proved unprofitable through faulty management, with the purpose of again making them profit-making concerns, the efficiency engineer having charge of its introduction receiving his recompense only after the plants were able to again pay dividends.

It would seem that the workers' welfare and his status as a human being, a mechanic and a citizen, did not receive much consideration until labor had rebelled against the system, and directed attention to many of its features which affected labor injuriously.

Time and Motion Studies.

"Time and motion study," said Frederick W. Taylor, "is the accurate, scientific method by which the great mass of laws governing the best and easiest and most productive movements of men are investigated. These laws constitute a great code, which, for the first time in industry, completely controls the acts of the management as well as those of the workmen. They substitute exact knowledge for prejudiced opinion and force in determining all the conditions of work and pay."

Time and motion studies are made with the assistance of split second watches, which enable the time and motion study men to time all motions, and from the analysis of the records thus secured and the study of the motions, to determine the time in which the work should be performed and the motions by which this is to be done. These studies are also made for the purpose of determining the most economical manner of doing the work.

Many of these time studies are exceedingly minute, some of the workmen's instruction cards showing as small an allowance as one hundredth of a minute for the performance of a part of the work, and make such fine distinctions as the allowance of two hundredths of a minute for laying down a wrench, while three hundredths are allowed for picking it up, as shown in the reproduction given from an instruction card for operation.

Instruction Card for Operation.

	Time allowed in hundredths of a minute.
Put piece on arbor	.15
Pick up wrench	.03
Tighten expansion arbor	.15
Lay down wrench	.02
Run carriage up and set pointer at o	.16
Put tool in post and set in center of pully	.79
Put piece on stud and fasten	.24
Start machine	.02
Set tool for turning and throw in feed	.18
Turn outside diam. 2 inch run	1.64
Throw out feed	.01
Face inside and outside diam. of flange	.82
Stop machine	.14

Accuracy in Time Study.

Much has been said about the scientific accuracy of time studies, for the efficiency engineers realize that, unless the stamp of accuracy was placed upon time studies and the task for workers to perform which were set as a result, the scientific character of their theory, and its results when applied, would be successfully challenged.

At the beginning of the investigation it was apparent that scientific accuracy in the timing of work and the setting of a task was an impossibility, owing to the large amount of judgment which was required on the time study men's part. The number of time studies to be made on a job before the task was set were determined by the time study man, with no other rule to guide him but his judgment. His judgment also determined how many of the workers should be studied in connection with a job, the type of workers to be selected, that is, whether slow, average or speedy, whether they were working normally while he was timing them, and the allowances he would make for fatigue and the other human factors. When these elementary time studies were analyzed it was the time study man's judgment which determined how many of the longest or shortest times would be thrown out, and the groups of times to be selected from which to strike an average, or whether the minimum times should be the ones chosen. In almost every establishment a different basis or rule for determining the times to be selected, from which the task would be determined, was found to be in operation. One time study man who was asked why he followed a certain rule in analyzing his time studies, naively informed us that he did not know how the rule was determined, but he "guessed that the rule had been constructed so as to get the results which its inventor wanted."

As the Hoxie report contains a thorough examination and analysis of the time and motion study methods found in operation, no effort will be made to go deeply into the question. Some of the conditions which were encountered, however, will be related.

Workers were found who expressed no objection to having time studies made on them, while others were strongly opposed to having a man stand over them with a split second watch in his hand.

In one plant, where time studies were being made for our benefit, it was found that there were wide variations as well as apparent errors in the figures which the time study man had entered upon his elementary time sheet. Upon his attention being called to this he said: "I generally come much closer to the average figures, but I knew that you were watching me while I was making the study and it made me nervous." The same man had previously assured us that it did not make the workmen nervous when he was making time studies of their work.

Varied Results in Time Study.

As was the case with many other features of scientific management, it was found that the results of time and motion studies varied widely in different establishments, and that other factors aside from the records secured by time and motion studies influenced the task setter in making the task easy or difficult of accomplishment.

At one plant in which the tasks were set by one of the most widely known efficiency engineers it was found that he had set these so liberally in one of the departments that the workers were earning more than the firm was willing they should, with the result that some time after the engineer had finished the installation of his system in some of the other departments the firm refused to allow the system to continue, and returned to the former methods of regulating the day's work and day's pay. This resulted in a lowering of the earnings to their former level in the department referred to, and a strike was narrowly averted.

At another plant, where a most prominent efficiency engineer had introduced parts of the system and set the task, it was found that he had set them so high, had made them so difficult of achievement, that the workers could not accomplish them. It became necessary to revise all of these tasks and liberalize them in order to retain their employees.

Another establishment afforded an insight into some of the motives which entered into the setting of the tasks, making them difficult or easy of accomplishment.

The plant was a large one, with many departments, covering in some cases work largely of a similar character. In the one which had been placed under scientific management the task and bonus system of payment prevailed, while in another which had not been time-studied and standardized the old-fashioned piece rate system prevailed. This plant had been frequently referred to by others as an example of the benefits of scientific management to the workers, for it was claimed that under the piece work system the workers worked harder and received less wages than in the department where scientific management had been installed. Our investigation proved this to be a fact, for unquestionably the workers in the scientific management department were working with less evidence of feverish haste than in the piece work department, and their earnings were greater.

Desired by Workers.

A careful investigation, however, indicated that these surface indications were misleading. When the corporation determined to install scientific management in this particular plant they were informed by the efficiency engineer that there was a strong prejudice against the system among the workers, which it would be necessary to overcome before it could be successfully installed in all of the departments.

As a first step he increased the hourly rate two cents in this department, installing with it a task and bonus system, which when the task was accomplished gave the workers about a twenty per cent addition to their hourly wage rate. The tasks were so set that practically every worker could accomplish them without undue exertion, the result being that at the time we visited the plant, they were working more easily and receiving higher earnings than the piece workers. We found, however, that the cost of production in this department was higher than in the piece work departments, and that this was the principal reason why it had not been installed in them.

This was an instance where the workers wanted scientific management, preferring it to day or piece work, and under these circumstances it was not surprising.

There remains another condition in connection with this situation which must be referred to. Within a few miles the same corporation had another large plant, and here the manager, using such information as could be secured relative to the mechanisms of scientific management, was installing the system. Here, however, none of the tasks were easy of accomplishment, and no advance in the hourly wage was being given. The workers were rebelling against the conditions being forced upon them, while the superintendent of the department where the system had first been installed complained of what the manager in the other plant was doing, saying that it looked as though he was trying to show him up.

Under such circumstances, and with one manager pitted against another, it is evident that something far stronger than the fair promises and assurances of scientific management must be at the workers' disposal to protect them from abuses, speeding up and poor pay.

In practice it was frequently found that where more than one job was given to a worker, the task set, or the standard of achievement, was much more difficult of accomplishment in some cases than in others. If the tasks were set with scientific accuracy it would be expected that the normally competent worker would achieve the task approximately one hundred per cent of the time, or to use the technical language of scientific management, "that this efficiency in accomplishing his work would be one hundred per cent." If the recorded efficiency of individual workers on various jobs indicated a wide variation, then it is but natural to assume that the variations were due to the inaccuracies of the task time set for the several jobs.

Miner Chipman's Arsenal Work.

An interesting and most valuable analysis of variations of output by the same workmen under scientific management has been made by Miner Chipman, and we give the following figures from the study which he made of the conditions existing at the Watertown arsenal after the system had been introduced.

The analysis of the men's output or so-called efficiency covered a period of one month, which makes it well representative of the unevenness with which the tasks had been set.

For the month of March, 1914, employee No. 2518 worked on 224 jobs. His average efficiency was 121.35%, but his efficiency on these jobs varied from 21% to 200%.

In September, 1913, employee No. 2681 worked on 91 jobs. His average efficiency was 96%, but his efficiency on the several jobs varied from 39.3% to 149%. Employee No. 2518 worked on 140 jobs during April, 1914. He was a most competent workman, as his average efficiency for the month was 121%. His efficiency on the several jobs ranged from 45% to 172.9%, these variations indicating largely the too short or too long time which had been set on the jobs by the time study and task setting man.

Commenting on these figures, Mr. Chipman said in his report:

> Mr. Taylor, in his "Shop Management," emphasizes "that this system rests upon an accurate and scientific study of unit times," which is by far the most important element in scientific management." He also says that time studies made by this method determine with scientific accuracy "the quickest time that can be made by a first-class man" and to the effect that this "quickest time" or "standard times" is so set that it cannot be bettered.
>
> What can be thought of the times set on these jobs, when this workman on the 224 jobs of one month showed a range of efficiency (efficiency being the ratio of time taken to time allowed) from 21% to 200%, with an average of 121%, and the following month on 140 jobs a range of from 45% to 173%, also with an average of 121%?
>
> This workman may be rated as consistently of high efficiency. Why then this extreme variation in efficiency unless the time allowed for each job was not set accurately and scientifically? Can we assume that the worker varied in efficiency to the extent shown by the chart? We do not believe so. The variation is one of time setting or inaccuracy of time study.
>
> Of the 244 jobs in the first month the time on 13 jobs was correct, efficiency 100%; on the remaining 211 jobs the time varied 2.755 minutes, or 22.2% from a total standard time of 12.935 minutes.
>
> A study of the various jobs indicates that the variations in efficiency are due in part to the time study man and in part to changes in conditions affecting work.

On two jobs in the foundry examined by the writer a difference of two hours and thirty minutes had been set, though at the outmost there could not have been more than ten minutes difference in the time to make the molds, as the patterns were almost identical, and were made in the same flask, the only apparent difference being that a longer hub on one of the patterns required about two inches more sand in the drag.

An interesting case, through which the worker was forced to suffer because of the error made in setting the time for the task, occurred in one of the machine shops visited.

A machinist was given eight crossheads to finish, forty-four minutes being allowed for the finishing of each crosshead. As this machinist took considerably more time he was punished for his failure to accomplish the task by being laid of for thirty days.

During this period a more careful investigation was made of the job, and it was afterwards given to another machinist, who received a rate three cents less per hour. The time allowed for the finishing of the task was increased 120%, and although the machinist working on the job had a rate three cents less per hour than the other it increased the cost of production 78%. The machinist who was disciplined, however, was not allowed anything for the unjust punishment which had been meted out.

Practice More Important Than Theory.

It would be possible to go on almost indefinitely in submitting evidence to prove that the time set on jobs by time study men and task setters in shops where scientific management had been applied has been anything but scientifically accurate. While in theory it should have been, what the workers are directly interested in is what occurs when application of a theory is turned over to employers and placed in practice. It is the practice and not the theory which most vitally affects the workers.

While in theory the time allowed for the performance of a task or job is scientifically accurate, if it has been set as the result of time and motion studies, it was evident to the efficiency engineers that mistakes would be made, and that these would cause dissatisfaction among the workers.

A Reiterated Principle.

To give them confidence that they would have no unfair advantage taken of them, scientific management laid down a principle upon which it has placed the greatest emphasis. This is that once a time or standard had been set for the performance of labor it would not be changed no matter how favorable it might be to labor. This principle is iterated and reiterated throughout the literature of scientific management.

As far as our investigations were able to discover this rule generally obtains in practice, though managers were found who repudiated it, holding that when the task had been set too liberally the workers knew it, and that as all errors, particularly those which the workers are aware of, should be immediately acknowledged and corrected, it was unwise not to change the time on the job; in fact, that this was necessary if the firm's intelligence was to receive the workers' respect.

It should not be inferred, however, that once a too liberal time has been set on a job or task it remains thus forever. A slight change of the design, a subdivision of the operation, or some other minor change, readily gives opportunity for new time and motion studies, through which the error can be corrected.

Naturally, the question arises as to what follows when too short a time has been set. No comprehensive answer can be given, for neither trade unionism nor any other manner of collecting the workers' grievances, exists in plants applying the system, with perhaps one exception.

In practice, when workers complain that insufficient time has been allowed on a piece of work, they are shown the sheets upon which the time study man has entered the split second watch records, and are told that here are figures which show what was done, and that no one can go behind these, or it is demonstrated to them that the task can be done in the time set by the time study man or by some selected workman.

In one establishment a time of five hours and twenty-four minutes had been set for the performance of a task. As it required something over thirty-eight hours to accomplish it, the responsibility for the error was left for the time study men and the planning room to fight out, but the question of what would happen if the error had been less glaring, and how often these errors were made was one which, if answered, would throw more light upon what occurs when the task set places too great a strain upon the worker without harassing him enough to cause open rebellion.

Apprenticeship Unprovided For.

Scientific management makes no provision for apprenticeship. In one plant a definite apprenticeship system, which aimed to develop competent craftsmen, was in operation for a limited number of boys, but apparently this exception was due to one individual in the firm who still retained the conviction that thoroughly trained mechanics would still be required by the industries, at least for some years.

What was called an apprenticeship was in operation in a few of the plants, but the training being given was not for the development of craftsmen, but rather to instruct a few bright young men for positions in the directing staff.

Both in theory and in general practice scientific management abandons the method of apprenticeship for the purpose of craft and manual training, and endeavors to substitute in its place specialization and standardization.

Not only do many of the efficiency engineers hold that apprenticeship for the training of craftsmen is no longer necessary, as their system provides for production without all-round craftsmen, but in more than one instance the thought was brought out that training apprentices was expensive and did not bring practical results for the outlay of time and wages, that where a thoroughly trained mechanic was necessary it was advisable to go into the open market and secure craftsmen who had been trained in other plants.

An example of this viewpoint is supplied by the following statement, made to us by an expert in one of the plants:

> We cannot take a man under apprenticeship and let him do different things for four years, and then pay him $21.00 per week. We must put him on one job, and keep him on one job.
>
> There are some boys and girls in the composing rooms, and I would like to teach them to become printers, keyboarders, proof readers, make up men, stone men, and teach them two or three phases of the business, but I have the threat in the back of my head that at the end of four years I must make them earn $21.00 a week, and I can go at the end of the four years and get a much better workman for the money, so I must keep them on one job.

Specialization and Standardization of Labor.

In referring to the specialization which occurs under scientific management and the forms of instructions for workers which exist, the Hoxie report says:

> Once within the shop, scientific management, according to the claims made by Mr. Taylor, solves completely the vexing problem of the adaptation and adequate training of the workers. It sets "each man to the highest task for which his physical and intellectual capacity fits him," "employs in the shop a corps of competent specialists whose duty it is to instruct and train the workers and to assist them whenever difficulties arise in connection with the work," "systematically transmits" to them "all the traditional craft knowledge and skill which is being lost and destroyed under current industrial methods," "requires workmen to learn and to perform not one merely but several operations or tasks," and "educates and trains them mechanically as they were never trained before." In short, it constitutes a "practical system of vocational guidance and training," making possible the "mutual adaptation of the task and the worker," and opening the way "for all workmen to become first-class men."

After describing the conditions which were found in practice, the Hoxie report asserts that "The theoretical transmission to the workers 'of all the traditional craft knowledge which is being lost and destroyed under current industrial methods' amounts in practice to the transmission to the individual of the knowledge required for the particular narrow job."

In general, the managers of shops where the system was in operation held that they preferred the one job or one machine man to the thoroughly trained mechanic. On more than one occasion, I asked the managers of machine shops the following question: "If you needed a machinist to operate a lathe and two men applied for the position, both of an equally promising appearance, but one only claiming to be a lathe hand, while the other claimed to be equally competent to operate a planer and a boring mill, which would be hired?" The almost invariable answer was, "we would employ the man who could only operate a lathe, for he would be a specialist." This point of view was expressed by the manager of one large plant while explaining his attitude towards apprenticeship and specialization.

"Where you manufacture," he said, "you must specialize. We decidedly do not have the facilities here for making first-class all-round mechanics. A specialist is of value to the company and we compensate him. There is so much more intensification in every field that we prefer a specialist to an all-round mechanic."

Ambition Curtailed.

Another manager of a large establishment said to us: "The worker under the present specialized system is as well off as under the old, but the old skilled workman is no longer required," and after a short pause he added, "the trouble is that the workers to-day are not as ambitious as they should be under the conditions."

What ambitions could be gratified by feeding the same shape of metal into a machine for days, weeks and months, or in screwing nut 47 or 73 on an automobile with no opportunity of rising in the scale as a craftsman, must be left to a Munsterberg to discover.

In practice scientific management seeks continually to specialize and subdivide the work, so that the worker performs but a minute part of the work formerly done by a craftsman and required to complete a product.

In one of the foundries visited, five men were employed on various parts of the same small mold which formerly had been made in its entirety by one molder.

How to Sew On Buttons.

In a garment manufacturing establishment the manager informed us that previously there had been twenty-five operations to complete a pair of trousers, but now there were seventy-five; that under the old system there were about fifty separate operations, but now there were seventy-five; that under the old system there were about fifty separate operations in the making of a coat, but that under scientific management this had been increased to one hundred and fifty. Even in the pressing of the clothes, the pressers no longer pressed an entire suit, but only some of the parts.

Going through one large establishment we stopped before a girl who was taking threads previously cut to a certain length, threading these into a needle, and then waxing the thread. The firm's expert informed us that previous to the installation of scientific management each girl had threaded her own needle, cutting off the threads in lengths to suit herself.

The methods of scientific management, however, had shown this to be all wrong, for if a girl cut the threads too short she had to thread her needle too often, which was a waste of time, while if she cut the thread too long, she lost much time taking the long draws necessary until the thread became shorter. The girls sewing on buttons were, therefore, given different lengths of thread, and a careful record was kept of the number of buttons each girl sewed on per day, and when the length of thread which enabled the girls to sew on the largest number of buttons per day was secured through analyzing the results, this length of thread was made the standard. Based on the theory that a girl trained to thread needles could do this more efficiently than any one else, one girl spent much of her time threading needles with the standard length of thread, this being one subdivision of the trade of sewing on buttons.

However, from a scientific standpoint, this was but a clumsy and slipshod result of an analysis of the sewing on of buttons trade, as we soon discovered, for in another garment making establishment they had studied this trade with a more searching spirit. If the length of thread with which the needle was threaded determined the number of buttons a girl could sew on in a day, then the length of her arms would also be a factor, for the girl with long arms would take a longer draw after putting the needle through the cloth and the button than the girl with short arms.

Once this scientific fact was discovered the experts made elaborate studies of the problem, girls with short, medium or long arms, working with standard lengths of thread, being watched and the results of their day's output analyzed. As a result of these studies it was possible for the experts to discover the proper length of arm to enable a girl to sew on the largest number of buttons, and the employing department was instructed to supply the button sewing department with girls whose arms were of the desired length. But even this was not scientifically thoroughgoing, for it was found that the length of the fingers undoubtedly had an influence, and studies were made to determine what the most efficient length of fingers was, so that the girls in this department who were being specialized as button sewers would all have fingers and arms of the same length. So in time the firm had a group of girls sewing on buttons, with standardized lengths of thread, with their standard fingers and arms.

Here was the perfection of scientific management.

But human nature or human qualities and characteristics are prone to upset the rigid rules of mechanical motions when these are applied to them.

It was not long before the experts, who had studied for many weary days with stop watches and pondered deeply over huge masses of the time studies they had accumulated, discovered that though they had standardized the length of thread and the length of fingers and arms which were to sew on buttons with the thread, there was still a wide difference between the girls' output.

What the efficiency experts had failed to standardize, what as a matter of fact they could not standardize, were the physical and mental qualities of the workers, their vitality, their ambitions, their nervous co-ordination, their ability to work without physical, nervous and mental deterioration under the monotonous character of their work.

In the end, in the latter plant, standard lengths of thread, or of fingers, or of arms, were discarded, and each girl was permitted to cut the length of the thread to suit herself, with the result that the unstandardized girls were apparently enjoying better health, were less rushed, and were doing better for themselves and their employers than their standardized sisters.

There may have been a modicum of scientific research, coupled with other objects, which led to the original time and motion studies resulting in the standardizing of the lengths of thread, fingers and arms in the trade of sewing on buttons, but the welfare of the girls, the desire to teach them to become competent garment workers, was certainly not the prime motive.

Results of Over Specialization.

A result of this specializing and subdividing of the work is the employment of workers of less craft knowledge and narrower manual skill, who for lower earnings replace the skilled workmen. One instance came under our observation where skilled workmen who had been employed for years by the firm and whose earnings were from thirty dollars per week upwards were replaced by girls and women whose wages were less than half of that amount. These female workers each completed but a small part of the finished whole.

The extensive specialization which occurs could be illustrated by a barber shop where one worker would attend to the hot water, another work up the lather, a third apply it to the face, a fourth do the shaving, a fifth the stropping of the razor, while still others would respectively wash, dry and perfume the shavee's face. It is true that each of these workers might be termed a highly trained specialist, but such a narrow degree of craft or industrial knowledge would be of little practical value to him, to the community, or to the industries.

The detailed observations of the workers' motions while at work, known as motion study, are carried on for two principal purposes.

The highly skilled workers are closely observed so that their manual motions and method of laying out and handling their work may be studied until a record of the most efficient method of doing each minute part of the job can be secured and analyzed.

The best way to pick up a tool, to use it, to handle the material and prepare it for the finished product, are determined by the time and motion study man and recorded. This enables him later on to take the work formerly requiring skilled workmen and sub-divide it, giving the doing of one part of the job to one worker and another to someone else taken from the ranks of the lesser paid and taught to do the simple parts of the job to which they were assigned.

Transferring Craft Knowledge.

Through this careful study of every motion and method used by the skilled worker and its recording upon index cards, the employer in time acquires as personal property the craftsman's skill and knowledge, and then doles this out to the lesser skilled and lower paid workers, who are then employed to supplant the skilled craftsmen formerly required.

This practice raises a most serious problem relative to which the Hoxie report says:

> There can be little doubt that scientific management tends in practice to weaken the power of the individual worker as against the employer, setting aside all questions of personal attitude and the particular opportunities and methods for voicing complaints and enforcing demands. As we have seen, it gathers up and transfers to the management the traditional craft knowledge and transmits this again to the workers only piecemeal as it is needed in the performance of the particular job or task. It tends in practice to confine each worker to a particular task or small cycle of tasks. It thus narrows his outlook and skill and the experience and training which are necessary to do the work. He is therefore easier of displacement. Moreover, the changing of methods and conditions of work and the setting of tasks by time-study with its assumption always of scientific accuracy put the individual worker at a disadvantage in any attempt to question the justice of the demands made upon him, and the assumed payment of wages in proportion to efficiency with the opportunities of exceptional reward held out if he will but make the task, tend to put upon him responsibility for wage results of which he complains. There are no simple, definite, recognized and permanent standards of work and earnings to which he can appeal. The onus of proof is upon him and the standards of judgment are set up by the employer, covered by the mantle of scientific accuracy. The unskilled worker, especially, under scientific management, loses what little chance of success as an individual he may elsewhere have, in any contest with the employer, and scientific management, from the standpoint of competitive power, tends to relegate workers to the condition of the unskilled.

In addition to the gathering up of the craftsman's skill and transferring it to the employer's indexed records, motion study in practice is applied in instructing the worker so that no unnecessary motions will be made in connection with the work. The instructor with the motion study records at his disposal, plus the untrained worker, is expected to take the craftsman's place.

If the form of specialization which was found in operation in the great majority of plants visited could be applied to our industries as a whole, craft skill and knowledge among the workmen would disappear. The craft knowledge would become the employer's property in the same degree that his machinery is something personally owned, craft skill would also be the employer's possession, that particular part required for the performance of the work being given to the worker by instructors. The workers would have neither knowledge nor skill except that small and limited part which would be required to accomplish the simple portion of the work to which they were assigned.

The manager of one large establishment informed us that owing to the degree of specialization he had carried out it was possible for him to take untrained workers and instruct them so that in ten of fifteen days they could do the most of the work in the plant. Others informed us that in a month or two, under their system, they could make fully competent operatives for the work in their establishments. In a word, the specialization and standardization of labor under scientific management as we found it, provides no apprenticeship system for the training of craftsmen and assumes that the thoroughly trained mechanic is no longer required except in rare instances. It aims to replace the trained craftsmen with workers whose knowledge is limited to a few simple operations, and whose labor is directed by instructors.

If generally applied the craftsmen would pass out of existence, and the workers would become dependent for their existence upon the scanty and insignificant industrial knowledge and experience afforded them by their limited opportunities, regulated by those who, in addition to ownership of machinery, had also acquired possession of craft knowledge and the skilled workers' methods.

Over-Speeding Prevented.

One of the strongly defended claims of scientific management is that it prevents the workers from being over-speeded. Frederick W. Taylor held that:

> Scientific management seeks to eliminate over-stimulation, over-speeding, and nervous and physical exhaustion of the workers
>
> 1. by substituting exact knowledge based upon a careful study of men and machines for guess work in the setting of the task, and the determination of the hours and other conditions of work;
> 2. by eliminating thus the need for the employment of pace-makers;
> 3. by transferring from the workers to the management responsibility for contriving the best methods of work;
> 4. by removing from each worker responsibility for the work of others, and for the instruction of beginners and helpers;
> 5. by maintaining the best conditions for performing the work through furnishing the best tools and materials at the proper time and place;
> 6. by training the workers in the most economical and the easiest method of performing operations;
> 7. by standardizing equipment and performance;
> 8. by instituting rational rest periods and modes of recreation during working hours;
> 9. by surrounding the workers with the safest and most sanitary shop environments.

As found in practice, scientific management presented a wide range of conditions from which to draw conclusions as to the claim that under this system over-speeding is prevented.

In no instance was it found that the philosophy of the shorter work day had influenced any efficiency engineer or employer to reduce the hours of labor, while one of the leaders of scientific management informed us that the workers could be employed ten or twelve hours per day without any physical injury resulting.

In one or two plants systematic efforts had been made to prevent over-speeding, workers were advised not to endeavor to accomplish more than the task, and in one instance as a deterrent workers were penalized through a sharp reduction in the sum allowed for the completion of the job. In general, however, the workers were encouraged to beat the task, through both the employer's policy and the foreman's efforts to secure their bonus, the winning of which depended upon the workers achieving the tasks.

Reference to what appears under the head of " Time and Motion Studies" will indicate the unscientific, irregular character of much of the task setting, and the various influences which animated the task setter while engaged in his work. The reward received for reducing the cost of production, the employers' desire for speedy results, the temptation to make a better record than some other efficiency engineer or task setter, these and other motives operate to set the task so high that over-exertion is necessary to accomplish them in many instances.

Lack of Fatigue Studies.

Nowhere was it found that fatigue studies had been made, which would be of value. In fact, no scientific study has yet been made of the subject of fatigue, or of the workers' long-time efficiency, and as no comprehensive studies of human fatigue have been made by scientists, there is no data upon the subject which would warrant anyone's speaking upon it with authority. But even if there were, the important questions would be the manner in which the knowledge of the subject would be applied to the workers, and the degree to which it would safeguard them from over-strain. Upon this subject the Hoxie report says:

> A much more definite issue is brought up by Mr. Taylor's claim that scientific management guards the workers against over-speeding and exhaustion through careful studies of fatigue and the setting of the task on the basis of a large number of performances by men of different capacities and with due and scientific allowance for the human factor and legitimate delays. It has been pointed out already in the discussion of time study that tasks are set in all sorts of ways, with reference to the men chosen and the number of performances timed. There is no general rule. And it was also demonstrated that no scientific method had been developed for the making of human allowances, and that these are sometimes very liberal, but sometimes also unduly curtailed. It must be admitted on the other hand that scientific management can and often does go far through the study of machinery and the careful observation of the on-going process of production toward the establishment of proper allowance for legitimate delays, not connected directly with the human factor. When we come, however, to the matter of fatigue studies, and their connection with speeding and exhaustion, Mr. Taylor's claim seems to break down completely. No actual fatigue studies were found taking place in the shops, and the time study men employed, who should be charged with such studies, seemed, in general, to be quite indifferent or quite ignorant in regard to this whole matter. Fatigue studies apparently are not made when the tasks are set, and, if afterwards complaint is made, the classical method of dealing with the subject is to "demonstrate" to the worker that the task can be done in the time set. Efforts to discover from scientific management experts proper methods for studying fatigue brought out only vague replies. Were it not for certain examples cited in scientific management texts, there would seem to be no ground for crediting it with any scientific aspirations in this connection. This does not mean that no attention to fatigue is given in scientific management shops. Cases were found where the health and energy of the workers were carefully observed and attempts were made to adapt the work to their condition, but the methods employed were the rough and ready ones of common sense observation.

While it is true that some efficiency engineers and employers have taken the element of fatigue into consideration with the object of preventing the worker's overexertion, it is equally as true that others aim to develop a system which will spur the workers to their limit. The speed competition attitude on the workers' part is developed through many clever methods. In one plant the workers were divided into small groups, each group having a high post near it upon which two large signs were hung, one showing the number of pieces the group must finish during the day to complete their task and the other the degree of progress they had made. These signs were so prominent that the workers in one group could see the figures upon all of the other signposts in the room. From time to time the speed bosses went from group to group, counting up the finished pieces and then posting the total finished work, so that the several groups could race with each other, or, what really was the case, realize that they were pitted against each other. It is but natural to anticipate that under this method the several foremen would vie with each other and endeavor to have the workers under them the speediest, for the resulting favor from the office which this would bring. One efficiency expert was quite frank upon this phase of the subject, and in writing about the atmosphere of speeding up which had developed, he said, with reference to a molder working under his system:

> This same man asked to be told a day before the pattern went out of the sand, so that he and his gang could put up a record that no other gang could touch.

An Example of Overspeeding.

One instance showing the extent to which efficiency experts can develop methods of speeding the workers up to their physical and nervous limit made a permanent impression upon the investigators.

The plant employed the usual forms of time and motion study for the determination of what the task should be, and the workers were paid a bonus if they accomplished the task. For example, if the time set upon a task was one hour, the worker, if he finished the job in an hour, was credited with an hour and a quarter's pay, based upon his hourly wage rate; so that if this was 20 cents, he would receive 25 cents for the hour's work.

This bonus was not considered sufficient to properly assist and stimulate the workers, so the foreman was also paid a bonus, this being based upon the number of workers under his charge who earned their full bonus. For the foreman's efficiency to reach 100 percent it would be necessary for every worker in his gang to earn their bonus every hour of the working day. It was, therefore, to the foreman's interest to do all that lay in his power to see that every worker accomplish the task which had been set.

However, this was but a part of the scheme or system which aimed to get all of the work possible out of the workers, for another factor entered largely into the plan. The time study man and task setter was also paid a bonus which was based upon the number of workers who failed to make their tasks, the task setter's efficiency reaching 100 per cent only when every worker in a group failed to finish their jobs in the time set for the accomplishment of their tasks. The time study man was, therefore, paid a bonus to set the tasks so high that the workers could rarely, if ever, accomplish them, while the foreman was paid a bonus based upon the number of workers who could be prevailed upon to finish their jobs within the time set.

Under this system there were no rest periods or other provisions which would prevent the workers from being speeded up to their limit, but instead it became a contest between the time-study man and the foreman, the one depending, for his extra wages, upon setting the time so short for the finishing of the task that the workers could not make it, and the other only receiving his bonus when he succeeded in having the workers accomplish these tasks. It was a clear case of playing both ends against the middle, the middle in this case being the unfortunate worker.

In theory scientific management would protect the worker from over-exertion; in such an instance as the one just referred to the practical application of the system deliberately and with human ingeniousness aimed to secure the worker's last ounce of energy.

Even where the system did not aim to drive the workers to extreme exertion there was frequently a total absence of any provision to allow the workers a rest or breathing spell. In one plant the workers had requested that they be allowed rest periods, and this had been denied. Some of the workers, desiring rest periods, had hurried up their work so that a few minutes of rest would be secured between tasks. The firm had notified the workers that this practice must cease, but the workers had persisted and their determination was so evident that they were finally allowed to take rest moments. In this plant, which was operated by a man of high ideals in many ways, a condition was found in one department where, because of gang production, and the interruption in the gang process caused when one worker stopped, the women workers were practically unable to attend to human necessities during working hours. It is but fair to say that the general manager would not have tolerated the existence of such a condition had he known of it, for at heart he was a humanitarian. However, one of the very serious defects of scientific management is that it does not keep the manager informed of much that affects the workers, their rights, their welfare and their desires.

Cumulative evidence was acquired during the investigation to prove labor's contention that scientific management in operation tends to speed up, that in many instances workers under this system have been speeded up to their physical limit, and that as applied by many it is intended to accomplish this result.

Industrial Democracy and Scientific Management.

The controversy which centers about time study, task setting and the methods of payment employed by scientific management is perhaps of secondary

importance to the attitude of scientific management towards industrial democracy and its relation to the workers.

Mr. Taylor has claimed that:

> Scientific management is the essence of industrial democracy. It substitutes the rule of law for arbitrary decisions of foremen, employers and the unions and treats each worker as an independent personality; it transfers to the workers the traditional craft knowledge which is being lost and destroyed under current industrial methods; lessens the rigors of shop discipline; promotes a friendly feeling and relation between the management and the men, and among the workers of a shop or group; it gives a voice to both parties—to the workers in the end equal voice with the employer—and substitutes joint obedience to fact and laws for obedience to personal authority. No such democracy has ever existed in industries before.
>
> Every protest of every workman must be handled by those on the management side and the right or wrong of the complaint must be settled, not by the opinion of either of the management or the workman, but by the great code of laws which have been developed and which must satisfy both sides; both can refer only to the arbitrament of science and fact. Scientific management thus makes collective bargainings and trades unionism unnecessary as a means of protection to the workers, but it welcomes the co-operation of unionism.

Organized labor has declared that scientific management is essentially autocratic, a reversion to industrial autocracy which forces the workers to depend upon the employer's conception of fairness and justice and limits the democratic safeguards of the workers, that it tends to gather up and to transfer to the management all the traditional knowledge, the judgment and the skill of the workers, and monopolizes their initiative and skill in connection with work; that it ordinarily allows the workmen no voice in hiring or discharging, the setting of the task, the determination of the wages or the general conditions of employment; that it greatly intensifies unnecessary managerial dictation and discipline; tends to prevent the presentation and denies the adequate consideration of grievances and tends to increase the number of shop offenses and the amount of docking and finding; it introduces the spirit of mutual suspicion and contest among the men and thus destroys the solidarity and co-operative spirit of the group; it has refused to deal with the workers except as individuals; it is incompatible with and destructive to unionism; it destroys all the protective rules established by unionism; and, finally, it is incompatible with and destructive to collective bargaining.

Industrial democracy, as we understand it, is that condition in the industries which acknowledges and accepts the right of labor to a collective voice in determining what the terms of employment shall be, and the conditions under which labor is to be performed. It gives practical application to the principle that government in the shop, like government in the nation, should be by the consent of the governed.

It has not been my purpose to discuss the theory of scientific management as expounded by its leaders, but rather to call attention to the conditions affecting labor which were found to exist in plants where scientific management had been installed. It is essential, however, that attention should be called to industrial democracy as it is apparently understood and defined by those who apply the principles of scientific management, for, unless this is done, it would be impossible to understand the attitude which scientific management has assumed towards labor.

Mr. Taylor has held that the relations between employers and workers are governed by a fundamental harmony of interests. Assuming this to be true and that perfect equality of interests exists between them, complete democracy in all of their relations is to be secured by setting aside the employers' personal authority, and the arbitrary rules and regulations of the workers, with all of the machinery for negotiations and the enforcements of decisions created by both, and substituting at all times the impersonal dictates of natural law and fact. It is the democracy of science as applied to industry. All that is necessary to realize this is to have in the shop a corps of scientists to determine and declare to employers and workers the objective scientific facts.

"If," as the Hoxie report says, "Mr. Taylor's original assumption is correct, and if all industrial matters touching the relations of employers and workmen have been or can be reduced to a purely scientific basis his conception of industrial democracy is valid, and if it is adhered to by scientific managers generally, the worker has no need of unions, union machinery or collective bargaining to voice his complaints and enforce his demands in order to secure just consideration of his interests and equal voice with the employers in the determination of all matters of mutual concern."

However, as a matter of fact, neither is the Taylor assumption correct, nor is it adhered to by scientific managers generally.

Conditions and Terms Objective Facts.

Theoretically, Mr. Taylor and other leaders of scientific management have held that the elements of the conditions of labor and the terms of employment can be demonstrated as objective scientific facts and are, therefore, no more subject to bargaining or arbitration that the question of the earth's revolution on its axis or the principles of arithmetic. Perhaps no feature of scientific management indicates a wider divergence between a theory and its application than the one under consideration. As one efficiency expert said to me, after spending some time with him in investigating a plant where he had assisted in introducing the system: "All of this talk about scientific management benefitting labor is bosh. We have to use it for policy's sake. The employers are after the results, and what ——— and I are after is the money, for the financial results are the first consideration. When ——— undertakes to introduce the system in a plant, he makes the first studies and gives the foremen the first instructions, and this frequently makes trouble, and then I am brought in as a pacifier or soft-soaper to follow up ——— and sling the salve. After this I take up the work of rate making and task setting."

This attitude was not exceptional, although it was sometimes expressed in choicer language. As one of the leading manufacturers said to us, "——— is a thinking machine of high order, and the system which he worked out is all right so long as he is not given any chance to apply it himself."

In one well known establishment, Mr. Hoxie said to the manager: "Your conception of industrial democracy is the employer sitting as a just judge and handing down his opinion, based upon the facts and arguments presented to him." The reply was: "To a certain extent." Mr. Hoxie added: "Then the final decision must rest with someone who is not biased," and the reply was, "Not necessarily, but it must rest with someone who is not biased and who is in authority."

This manager held that the question of fatigue, the difficulty of accomplishing the task, was not a matter for bargaining or for negotiation with the employer, but was a matter for scientific determination. He believed that the minimum wage rate was also a matter for scientific determination, as well as the hours for labor, yet in this plant, where the tasks were set under the system, the workers who did not accomplish them were penalized by being demoted to a lower hourly wage rate, and the worker who did not fall into line with the many rules set up was disciplined in other ways, or eliminated.

Scientific Shops Lacking.

Mr. Taylor's ideal shops with their corps of scientists, and scientifically trained time-study men and instructors were not encountered during the investigation. It is true that systems of scientific management had been installed by efficiency engineers possessed of marked ability and wide experience, men of high ideals and not wanting in the milk of human kindness, but these men did not remain in charge of the plant to direct the machinery which they had installed, and this work was taken up by other and inferior men. It is the work of the time study men which chiefly determines whether efficiency shall be combined with just and humane treatment of the workers, regardful of their present and future welfare.

> This being true, says the Hoxie report, the time-study man is, from the standpoint of labor, the central figure in scientific management,—its vital organ and force. To perform his functions properly, to make scientific management tolerable to labor, he must be a man exceptional in technical and industrial training, a man with a broad and sympathetic understanding of the workers as well as of the economic and social forces which condition their welfare, a man of unimpeachable judgment, governed by scientific rather than pecuniary considerations, and, withal, he must occupy a high and authoritative position in the management. For if he is to set tasks that will not cause nervous and physical exhaustion, he must not only have an intimate personal knowledge of the work to be done, the special difficulties it involves, the qualities required to do it well, the demand which it makes on strength, skill, ingenuity and nervous force, but he must also be able to recognize and measure nervous disturbance and fatigue and understand and deal wisely with temperament. If he is to set tasks that will always be fair and liberal, he must understand and know how to discount all the effects of current variations in machinery, tools and materials, in human energy and attention. If he is to safeguard the lives and health of the workers and their general economic and social welfare, he must be an expert in matters of sanitation and safety, and have a broad and deep understanding of economic and social problems and forces, and, finally, if he is to make all this knowledge count, he must be able to establish the standards warranted by his study and judicial weighing of men and facts, and to protect these standards against infringement and displacement. All this and more, if the claims of scientific management relative to labor are to be generally fulfilled.

Lack of Essentials in Time Study Men.

> But as things actually are, this emphatically is not the type of man who is habitually engaged in time-study work, and who is being drawn into it, nor does the time-study man of the present occupy this exalted position in the hierarchy of scientific management. The best men in this work are perhaps technically qualified, but so far as the observation of your investigator has gone, the best of them are technicians with little knowledge of the subject of fatigue, little understanding of psychology and temperament, little understanding of the viewpoint and problems of the workers, and almost altogether lacking in knowledge of and interest in the broader economic and social aspects of working-class welfare. The bulk of the time-studying men encountered were immature men drawn from the shop or from college. They were expected to get their knowledge and training in all the matters enumerated above through the actual work of time-study and task-setting. In the majority of cases encountered it was not considered essential that they should have had any special training in the particular industry. A man who had worked exclusively in the machine shop was considered competent, after a few weeks or months of contact and trial experience, to set tasks in a cotton mill. Sometimes previous industrial experience of any kind was not considered necessary. Analytical ability, good powers of observation, a sense of justice and tact were the chief qualities emphasized as essential for a good time-study man. Rarely, if ever, was anything said of technical knowledge concerning fatigue, psychology, sanitation, safety, and in broader problems of industrial and social welfare. Indeed, time-study and task-setting were almost universally looked upon as primarily mechanical tasks in which the ability to analyze jobs and manipulate figures rather than broad knowledge and sound judgment were regarded as the essential factors. Naturally, therefore, the time-study men were found to be prevailingly of the narrow-minded mechanical type, poorly paid and occupying the lowest positions in the managerial organization, if they could be said to belong at all to the managerial group. Nor does the situation seem to promise much improvement. For the position and pay accorded to time-study men generally, are such as to preclude the drawing into this work of really competent men in the broader sense. Aside from a few notable exceptions in the shops, and some men who make a general profession of time-study in connection with the installation of scientific management this theoretically important functionary receives little more than good mechanic's wages, and has little voice in determining shop policies. The start is often made at $15 per week. A good time-study man, according to current standards, can be had at from $75 to $100 a month, and $125 per month is rather high rating for experienced men, if the statement of scientific managers are to be trusted. In fact, the time-study man, who, if scientific management is to make good the most important of its labor claims, should be among the most highly trained and influential officials in the shop, a scientist in viewpoint, a wise arbiter between employer and workmen, is, in general, a petty functionary, a specialist workman, a sort of clerk, who has no voice in the counsels of the higher officials. There are, of course, exceptions to this general rule, but taking the situation as a whole, the quality of the time-study men actually setting the tasks in scientific management shops and the position which they occupy are such as to preclude any present possibility of the fulfillment of its labor claims.

Individual Worker's Power Weakened.

There can be little doubt that scientific management as we found it applied, tends to weaken the power of the indivdual worker, as against the employer, setting aside all questions of personal attitude and the particular opportunity and methods for voicing the workers' complaints and enforcing their demands. It tends in practice to confine each worker to a particular task or operation, or the most limited number of these. It narrows the worker's outlook and limits his opportunity of acquiring skill and knowledge through experience, and limits his growth towards craftsmanship. The worker is, therefore, easier to displace. Personal interviews with workers brought to light many instances of pressure, indicating how difficult, if not impossible, it was for them to act collectively under the systems. The individual workers were reluctant to call attention to work which had been poorly done by other workers, because it gave them the reputation of being cranks or fault-finders among the workers of their own and other groups, and made them objects of unwelcome attention on the part of the instructors, gang bosses, speed bosses and time-study men. Most of the workers interviewed seemed to feel themselves helpless in the face of the machinery which the system had built up, and each one was endeavoring to protect himself only. Frequently the worker who is timed on the job is a pace maker, and consciously such, which creates an attitude on the part of his fellow workers which can be readily understood. Where the task is set too high, the workers complain that their predecessors skimp the work in their efforts to earn their bonus, and that much of this skimped work passes the inspectors during the process of production. Neither is favoritism eliminated, this being particularly true where the foreman is paid a bonus on the work done under him. A source of irritation was also found in the sudden jump in rates which takes place under some of these systems when the task has been accomplished. The worker who just misses the mark, and, therefore, loses his bonus, feels irritated when he sees other workers attaining their bonus, through some favoring circumstances or because they have succeeded in evading the inspector's vigilance, or because the time studies have not been thorough enough to make proper allowance for difference in the skill required or the materials used on the job.

Dealing with this subject the Hoxie report says:

> Beyond the question of irritation is that of the general effect of scientific management methods on the motives and attitudes of the workers. Here the count seems to be decidedly in favor of the trade-union charges. Almost everything points to the strengthening of the individualistic motive and the weakening of group solidarity. Each worker is bent on the attainment of his individual task. He cannot combine with his fellows to determine how much that task shall be. If the individual slows down, he merely lessens his wages and prejudices his standing without helping his neighbor. If he can beat the other fellow, he helps himself without affecting the other's task or pay. Assistance, unless the man is a paid instructor, is at personal cost. Special rewards, where offered, are for the individual. The chance of promotion is supposed to depend on the individual record. Rules of seniority are not recognized. Sometimes, personal rivalry is stimulated by the posting of individual records or classification of the workers by name into excellent, good, poor, etc. Potential groups are broken up by the constant changes in methods and re-classification of workers which is the mission of time-study. The whole gospel of scientific management to the worker is to the individual, telling him how, by special efficiency, he can cut loose from the mass, and rise in wages and position to a man of consequence. Only by the welfare work outside the working hours is there anything done to bring the men together. But once seated at the bench or machine, they are so many individual atoms, each dependent on his own exertions for the position he shall occupy in the heap. Decidedly, then, scientific management does not tend to the development of group solidarity within the shop.

Scant Democratic Possibilities.

> With the power of the individual weakened, and the chances lessened for the development of groups and group solidarity, the democratic possibilities of scientific management, barring the presence of unionism, would seem to be scant. The individual is manifestly in no position to cope with the employer on a basis of equality. Collective bargaining directly by the men employed is, under the circumstances, almost unthinkable. Unless, then, scientific management has evolved and put into practice something to offset this manifest weakness of the individual and the shop group in their dealings with the employers, or holds itself ready to co-operate with unions outside, it cannot by any stretch of the imagination be called democratic.

We were almost invariably informed that the workers had every opportunity of having their complaints or grievances fully considered and adjusted, and that the door to the general manager's office was always open to the workers who had failed to receive satisfaction from those holding subordinate

managerial positions, but when efforts were made to discover how many workers have availed themselves of this privilege, the number was found to be practically zero.

General Labor Problems Upon Introduction.

Under this heading the Hoxie report brings together the results of the whole investigation in regard to the general effects and tendencies of scientific management relative to labor. It is, therefore, the clearest and most concise statement that can be made. As the work on this section was submited paragraph by paragraph to the experts, and it was modified by them in the process of making, it is in the nature of a joint product. On both accounts I feel justified in making my statement a condensation of this section.

Probably no one will dispute the statement that scientific management at its best greatly accelerates the modern tendency towards specialization of the workers. An example of this is afforded by the work of the machine operator, whose machine is not largely of the semi-automatic or automatic type.

A Difference in Type.

Under the ordinary form of management found in industries, the machine operator is something more than a mere feeder of material into a machine, for he performs manual and mental labor as the result of his craft knowledge and skill, which is as essential to complete the product as is the work done by the machine. In addition to being a machine operator, he cares for the machine, corrects and repairs minor accidents, makes necessary adjustments, attends to the belting and grinds his own tools. He exercises also, within reasonable limits, and where there is a call for his initiative and dependence upon his craft knowledge, individual judgment in the laying out and setting up of a job, and in determining the method and the feed and speed to be employed in running the material through. Under scientific management, on the other hand, in its fullest development, this same workman becomes a mere machine tender. All the extra work is done for him by a series of functional foremen or specialist workmen. The belting connected with the machine is cared for by a special functionary, the belt man; the tools which he uses are brought to him already ground by a specialist who does nothing else; his materials are always at hand, delivered by the move man, who also takes away the product. The laying out and setting up of the work, the feed and speed to be used in doing it, and the mode of handling the material and putting it through the machine are determined by special functionaries and embodied in written instructions, except where the functional foreman is actually present to perform or assist in the initial operation or where the work is so thoroughly subdivided and repetitive that actual instructions are not deemed necessary, and though the worker may depart in some instances from the instructions given, he does so at the peril of the bonus, premium or higher differential piece rate. Under the system fully developed, he is intended to be, and is, in fact, a machine feeder and a machine feeder only, with the possibility of auxiliary operations clearly cut off and with means applied to discourage experimentation. What applies to the machine feeder applies with more or less thoroughness to machine and hand operatives generally. Functional foremanship brings the managerial activity into every phase of the shop work. As Mr. Taylor said: "It effects a more equal division of the work between the management and the men by taking from the latter many of the activities which they were formerly obliged to perform."

But it is not merely in stripping from the job its auxiliary operations that scientific management tends to specialize the work and the workmen. Time study, the chief corner stone of all systems of scientific management, tends inherently to the narrowing of the job or task itself. The chief function of time study is the analysis of work, the reduction of operations to their elementary motions and units, and the recombination of these elements into operations more quickly and easily performed. Doubtless time study thus may sometimes result in the discovery that new elements or operations may be added to former jobs with a distinct contribution to efficiency and economy, or that former operations may be efficiently combined. But as the final object of time study, as far as it directly touches the workers, is to make possible the setting of tasks so simple and uniform and so free from possible causes of interruption and variation that definite and invariable time limits can be placed upon them, and the worker may be unimpeded in his efficient performance of them by the necessity for questioning and deliberation, the preponderating tendency of time study is to split up the work into smaller and simpler operation and tasks. This tendency is not always apparent in scientific management shops, because sometimes, especially where these represent an old established machine industry, the specialization of work has already been carried to the extreme possible with the machinery in use. But time study furthers the invention of new machinery of a more automatic type and of machinery for the performance of former hand operations. An interesting sidelight was thrown upon this whole matter in one shop visited where time study for standardization and improvement had been especially emphasized. Here former hand work has been progressively converted into machine work, and the cycle of many operations in the particular job had become so short that the management has been unable to catch them accurately by means of the stop watch, and so despaired of being able to set tasks by means of elementary time study. Decidedly, then, time study tends to further the modern tendency toward specialization of the job and the task.

Specialization to the Nth Power.

The inherent tendency to specialization is buttressed, broadened in its scope and perpetuated by the progressive gathering up and systematizing in the hands of the employers of all the traditional craft knowledge in the possession of the workers. With this information in hand, and functional foremanship to direct its use, scientific management claims to have no need of craftsmen, in the old sense of the term, and, therefore, no need for an apprenticeship system except for the training of functional foremen. It, therefore, tends to neglect apprenticeship except for the training of the few. And as this accumulation of systematized knowledge in the hands of the employers grows, they are enabled to broaden the scope of its operation, to attack and specialize new operations, new crafts and new industries, so that the tendency is to reduce more and more work to simple, specialized operations and more and more workers to the position of narrow specialists. Nor does scientific management afford anything in itself to check or offset this specialization tendency. The instruction and training offered is for specialist workmen. Selection and adaptation are specializing in their tendencies. Promotion is for the relatively few. The whole system, in its conception and operation, is pointed toward a universally specialized industrial regime.

The following editorial from a recent issue of the *International Molders' Journal* attempts to describe the condition which is being created by scientific management as we found it in practice.

> MODERN INDUSTRY AND CRAFT SKILL.
>
> The one great asset of the wage worker has been his craftsmanship. We think of craftsmanship ordinarily as the ability to manipulate skilfully the tools and materials of craft or trade. But true craftsmanship is much more than this. The really essential element in it is not manual skill and dexterity but something stored up in the mind of the worker. This something is partly the intimate knowledge of the character and uses of the tools, materials and processes of the craft which tradition and experience have given the worker. But beyond this and above this, it is the knowledge which enables him to understand and overcome the constantly arising difficulties that grow out of variations, not only in the tools and materials but in the conditions under which the work must be done.
>
> In the past, for the most part, the skilful manipulation of the tools and materials of a craft and this craftsmanship of the brain have been bound up together in the person of the worker and have been his possession. And it is this unique possession of craft knowledge and craft skill on the part of a body of wage workers—that is, their possession of these things and the employer's ignorance of them—that has enabled the workers to organize and force better terms from the employers. On this unique possession has depended more than on any other one factor the strength of trade-unionism and the ability of unions to improve the conditions of their members.
>
> This being true, it is evident that the greatest blow that could be delivered against unionism and the organized workers would be the separation of craft knowledge from craft skill. For if the skilled used of tools could be secured from workmen apart from the craft knowledge which only years of experience can build up, the production of "skilled workmen" from unskilled hands would be a matter in almost any craft of but a few days or weeks; any craft would be thrown open to the competition of an almost unlimited labor supply; the craftsmen in it would be practically at the mercy of the employer.
>
> Of late, this separation of craft knowledge and craft skill has actually taken place in an ever widening area and with an ever increasing acceleration. Its process is shown in the two main forms which it has been taking. The first of these is the introduction of machinery and the standardization of tools, materials, product and process, which makes production possible on a large scale and the specialization of the workmen. Each workman under such circumstances needs and can exercise only a little craft knowledge and a little craft skill. But he is still a craftsman, though only a narrow one and subject to much competition from below. The second form, more insidious and more dangerous than the first, but to the significance of which most of us have not yet become aroused, is the gathering up of all this scattered craft knowledge, systematizing it and concentrating it in the hands of the employer and then doling it out again only in the form of minute instructions, giving to each worker only the knowledge needed for the mechanical performance of a particular relatively minute task. This process it is evident separates skill and knowledge even in their narrow relationship. When it is completed the worker is no longer a craftsman in any sense, but is an animated tool of the management. He has no need of special craft knowledge or craft skill, or any power to acquire them if he had, and any man who walks the street is a competitor for his job.
>
> There is no body of skilled workmen to-day safe from the one or the other of these forces tending to deprive them of their unique craft knowledge and skill. Only what may be termed frontier trades are dependent now on all around craftsmen. These trades are likely at any time to be standardized and systematized and to fall under the influence of this double process of specialization. The problem thus raised is the greatest one which organized labor faces. For if we do not wish to see the American workman reduced to a great semi-skilled and perhaps little organized mass, a new mode of protection must be found for the working conditions and standards of living which unions have secured, and some means must be discovered of giving back to the worker what he is fast losing in the narrowing of the skill and the theft of his craft knowledge. It is another problem which the organized workmen must solve for themselves and for society.
>
> Under these circumstances, the progressive degeneration of craftsmanship and the progressive degradation of skilled craftsmen seem inevitable.

Scientific Management and Strikes.

In connection with the thoughts just expressed, I desire to submit another excerpt from the Hoxie report:

> Scientific management, it says, would seem to offer possibilities ultimately of better market control or better adaptation to market conditions, but the experience of the past year of depression indicates that at present no such possibilities generally exist.
>
> Finally, until unionism as it exists has been done away with or has undergone essential modifications, scientific management cannot be said to make for the avoidance of strikes, and the establishment of industrial peace. Mr. Taylor's statement that no strike has ever occurred under scientific management means simply that if a strike occurs, scientific management, in Mr. Taylor's conception of it, does not exist. Your investigator has discovered several well authenticated cases of strikes which have occurred in scientific management shops. He is inclined to believe that they are less frequent in this class of shops than elsewhere in similar establishments, owing largely to the fact that organized workmen are on the whole little employed. In its extension, however, it is certain that scientific management is a constant menace to industrial peace. So long as present day unionism exists, and unionists continue to believe as they seem warranted in doing, that scientific management means the destruction of their organizations or their present rules and regulations, unionism will continue to oppose it energetically and whenever and wherever opportunity affords.

Conclusions of the Investigator.

My purpose has been to describe the conditions affecting labor which were found in manufacturing establishments where scientific management had been introduced rather than to discuss or attempt to analyze the theories of this new factor which is being introduced into the machinery of production. My conclusions are drawn from evidence which was secured through personal observation of the investigators and the interviews which were held with efficiency experts, managers and shop men.

It is my opinion that the inequalities, variations and contradictions which were found in establishments applying scientific management were due:

1 To the employers' desire to apply just that portion of the theory and rules of scientific management which they deemed most advantageous to themselves.
2 To the desire to secure the fullest output of their plant by the shortest cut and the lowest immediate labor cost.
3 To the employer's personal viewpoint as to his relationship and duties to the workers in his employ.
4 To the extent to which the employer's knowledge of the laws governing production was balanced by a knowledge of the laws of economics and sociology.
5 To the extent to which the autocratic spirit is balanced by the employer's conception of industrial democracy in formulating shop rules and establishing the terms of employment and the conditions under which labor is to be performed.

In talking with the workers in scientific management shops we were informed that the system tended to cause some workers to slight their work to the limit made possible by the degree of inspection which prevailed over them; that it tended to the passing of work which was a shade under the standard; that it tended to develop deliberate schemes to slight work on the part of some workers and often became a source of friction between workers, as the slighted work increased the labor of other workers.

Many of the workers interviewed held that scientific management:

1 Makes the workers over-exert themselves.
2 Creates shop jealousies.
3 Enables foremen, through collusion with the planning room, to play favorites.
4 Makes workers shirk work, leaving the task more difficult for those next in the line for the handling of the material.
5 Forces the high grade workmen to often bear a large part of the burden of experiments and to work out new material without any adequate remuneration.

The evidence would indicate that, aside from the determination of machine speeds and the cutting speed of tools, time study is largely a matter of the time study man's personal judgment, for he determines:

1 How many time studies shall be made on the job.
2 When the time studies shall be made.
3 Whether the tools, the material and the equipment is in proper condition.
4 How many workers shall be timed on the job.
5 Who the workers shall be on whom time studies shall be made.
6 Whether they shall be the slowest, average or speediest workers.
7 What elementary times shall be thrown out; that is, the number of longest and shortest times which will be discarded from the record before the time to be accepted shall be computed from the figures which remain.

It was fully demonstrated that one object of scientific management was to specialize the work and divide it into the minutest subdivision possible, for the more thoroughly this was accomplished the more successfully the system could be operated from the employers' point of view and the shorter the period required to train new workers to perform the work.

Stimulation is Essential.

Regardless of the form of payment, whether bonus, premium or differential piece work, or any variation of these methods, the purpose is to stimulate the workers to accomplish the task which has been set for them by the time-study men, or the planning room. Without this stimulus the employers feel that the workers would not accomplish the task.

In the majority of instances there were no safeguards established to protect the workers from over-exertion, but instead they were stimulated to work to the extent of their physical ability and instances were encountered where the methods applied aimed to secure the workers' limit of strength and exertion.

In the great majority of cases there was no system of training intended to develop young men into competent craftsmen, and in many instances the statement was made that the thoroughly trained mechanics or craftsmen were no longer required. Apprenticeship, except in one instance, had been wholly discontinued and in this establishment, employing hundreds of workers, but nine boys were being given an opportunity of learning a trade.

General manual skill was not being developed. The rule was to train workers in the use of but a few hand or machine tools. The workers were made familiar with the manual skill required to perform but a few of the operations necessary to complete the finished article.

Except for the skilled craftsmen required to perform work which as yet it has been impossible to subdivide, and which, therefore, required skill, long training and craft judgment to accomplish, it was the practically unanimous opinion of shop managers that workers possessed of wide craft knowledge were no longer required. In hiring workers they seek for those who are familiar with but a few hand tools, one process or machine.

Stultifying Initiative.

It was apparent that under scientific management the workers were made dependent upon the functional foremen and the planning room for craft and mechanical knowledge required in the establishment:

1 Because the workers were trained to become "one job and one operation" men.
2 Because when leaving one "Scientific Management" shop in which they had received their training as workmen, they became practically unskilled labor, unless they could secure employment at their own subdivided and restricted specialty in some other shop.
3 Because a broad industrial training had been denied them.

It was evident that collective bargaining or negotiations relative to terms of employment and conditions of labor between employer and workers had been eliminated, as the employers arbitrarily determined:

1 All shop rules.
2 The rate of wage.
3 Whether labor should be paid by the bonus, premium, differential piece system, or some modification of these.
4 What should be the time allowed for the performance of a task, or the accomplishing of a so-called standard of efficiency.
5 What the hours of labor should be.
6 What industrial education should be given to the workers.
7 What method would be established by which the individual workers might receive a hearing.
8 What should be the basis of hiring and the grounds for discharge.
9 What facilities would be provided for performing the work.
10 That the workers should be dealt with as individuals, and that there should be no collective bargaining between the employers and workers to determine the terms of employment and the conditions of labor.

After Mr. Hoxie's report had been examined and endorsed by Robert Valentine and myself, a brief statement was prepared by the three who had participated in the investigation which contained the conclusions which they had jointly reached.

Participators' Conclusions.

My statement will be brought to a close by quoting the following, from these joint conclusions:

> Two essential points stand forth. The first point is that scientific management, at its best and adequately applied, exemplifies one of the advanced stages of the industrial revolution which began with the invention and introduction of machinery. Because of its youth and the necessary application of its principles to a competitive state of industry, it is in many respects crude, many of its devices are contradictory of its announced principles, and it is inadequately scientific. Nevertheless, it is to date the latest word in the sheer mechanics of production and inherently in line with the march of events.
>
> Our industries should adopt all methods which replace inaccuracy with accurate knowledge and which systematically operate to eliminating economic waste. Scientific management at its best has succeeded in creating an organic whole of the several departments of an institution establishing a coordination of their functions which had previously been impossible, and, in

this respect, it has conferred great benefits on industry. The social problem created by scientific management does not lie in this field. It is in its direct and indirect effects upon labor that controversy has arisen, and it was in this field that the investigation was principally made. For the present, the introducers and appliers of scientific management have no influences to direct them, except where labor is thoroughly organized, other than their ideals, personal views, humanitarianism or sordid desire for immediate profit with slight regard for labor's welfare.

The second point is that neither organized nor unorganized labor finds in scientific management any adequate protection to their standards of living, any progressive means for industrial education, or any opportunity for industrial democracy by which labor may create for itself a progressively efficient share in efficient management. And, therefore, as unorganized labor is totally unequipped to work for these human rights, it becomes doubly the duty of organized labor to work unceasingly and unswervingly for them, and, if necessarry, to combat an industrial development which not only does not contain conditions favorable to their growth, but, in many respects, is hostile soil.

The Brief for Scientific Management (Farnham)

4-17-16

By Dwight T. Farnham of the Emerson Company, St. Louis, Mo.

The science of efficiency is now receiving the largest advertisement ever given any doctrine in the history of the world. Whether the German army which now *is* the German empire can be properly said to be 100% efficient under the definition given by Mr. Emerson, in which he gives "correct ideals" as the first and most important principle, is a question which strict neutrality does not allow us to discuss. Nevertheless at this time, with the Russian army in full retreat, with the French barely holding their own on French soil and with England torn with the cry of "What is the matter with our army?" there are few who will not concede that as a fighting machine the German army is the greatest example of efficiency ever conceived.

Efficiency in the best sense is constructive rather than destructive and it is this phase that interests America at a time when the markets of the world are open to her as never before. What efficiency means to the manufacturer, the employee and to the community we have stated briefly in the following outline:—

A—FOR THE MANUFACTURER, Scientific Management

- I Cheapens the cost of production.
- II Eliminates labor troubles.
- III Increases output without increasing investment.
- IV Improves quality of product.
- V Insures prompt deliveries.

I A cheaper cost of production means

a) Greater profits as a whole and a lower cost per unit, which brings

b) Greater business stability, because a lower selling price permits a wider market to be covered, doing away with the effects of local business depressions;

c) Fewer shutdowns. Lower costs allows the factory to run at a profit long after competitors have to shut down to avoid loss.

II The elimination of labor troubles results in avoiding the expense of
- a) Shutdowns from strikes and lockouts.
- b) Loss of property and possibly life.
- c) Ill feeling on the part of workmen.

III An increase of output without increase of investment means
- a) Greater total profits—more units to sell.
- b) No necessity for raising more capital—with possible change in control.
- c) Slight increase in overhead expense.

IV An improved quality of product
- a) Decreases complaints and consequent loss of business.
- b) Facilitates sales.
- c) Increases demand.

V Prompt deliveries mean
  a) Satisfied customers.
  b) Increase in business through reputation for reliability.

B—FOR THE EMPLOYEE, Scientific Management Means

I Higher pay.
II Shorter hours.
III Steady employment.
IV Less fatigue.
V Better satisfaction in work.
VI Education leading to better life and higher ideals.

C—TO THE COMMUNITY, Scientific Management Means

I Better citizens.
II Lower taxes.
III Absence of strikes.
IV Steady flow of money from without.
V Less hard times.
VI Lower cost of living.

To understand how this is possible, it is necessary to explain briefly the two prevalent methods of handling labor.

Day Wage System

Workers are paid for time served, regardless of the work done.

The lazy man or the systematic soldierer receives as much pay as the hard working ambitious laborer.

The naturally ambitious worker has no incentive to do more than his lazy neighbor and probably does less, being better able to figure out and put into effect schemes for soldiering.

The foreman's usual means of determining the efficiency of his crew is their general appearance of bustle.

There is no incentive for the workmen to learn from each other, for the foreman to teach his men better methods, even if he knows them. The foreman is usually judged by the apparent busyness of his gang.

Day work is a grim game between the foreman and the laborers. His part is to drive them into doing as much as possible, by roaring at them and by keeping ever present the fear of discharge. Their part is to retain their jobs, meantime doing as little work as possible.

Piece Work System

Theoretically, since the workman is rewarded in direct proportion to the work he does, the ambitious worker makes the maximum of which he is capable, the lazy worker is proportionately penalized and the output of the shop is maintained at the highest level; supervision is required only to maintain quality and it is to each worker's advantage to keep his machine in the best possible shape.

Actually the whole thing goes to pieces on the difficulty of setting proper piece rates. In the usual course of events it is necessary to set a new piece rate before any quantity of the article in question has been manufactured. Setting the rate therefore resolves itself into an argument between the boss and the worker, based on past records, and the final bargain is a compromise.

As the worker gains experience in making a new article he naturally cuts the time per piece—as much as he dares—and earns as much as he dares—knowing from past experience that if his daily earnings go beyond a certain point his rate per piece will be cut.

It is to the worker's advantage to set the rate as high as possible, so that he may earn as much as his boss will let him with the least possible effort—especially as his record on this job will be used as a basis for bargaining on the next job.

All this leads to certain subterfuges which hurt the employer and have a bad effect upon the character of the employee. If the worker discovers a quicker way to do the job he keeps it to himself. That becomes one of his reserves to draw on when the boss drives him to the limit. He does not spend any time inventing new tools or devices to do the work more quickly. He is willing that there should be enough breakdowns so that the boss will have to allow for breakdowns next bargain day. He favors a slow speed and lost motion on his machine and he argues the necessity of various false motions in handling the material.

The weak are driven too fast, knowing only speed and strenuousness where under a different system they would be carefully taught every detail of the work, the obstacles removed and gradually fitted to do efficient work.

The general effect of the piece work system is to place a premium on inefficiency and hypocrisy to make for suspicion, mutual distrust and antagonism between employer and employee.

A—For the Manufacturer

I The cost of production is cheapened by scientific management as follows:

1 Labor cost is reduced by each workman doing as much work as possible because:—

a) It is to his advantage to do so as the bonus system pays him fairly and justly in proportion to what he accomplishes.

b) There is no chance for soldiering—since the shortest time in which the work can be done is determined by scientific methods —*before* he begins the work.

c) The worker's motions are analyzed, all unnecessary ones eliminated and the laws of physics, anatomy and psychology brought to bear upon the balance to assist him.

d) His machine is speeded for production in the shortest time.

e) Tools best adapted for the work are furnished in the finest of condition.

f) All obstacles to continuous performance are removed, breakdowns are reduced to a minimum, supplies are delivered as needed, no time is lost asking for instructions or hunting foremen.

g) Machines are so grouped as to reduce the movement of material to a minimum and the worker has the advantage of securing the right thing, at the right place at the right time.

h) The worker's skill is increased and he is stimulated to suggest improved methods and devices.

i) He has to assist him, combined and in useable form, the past best practice, the experience and intelligence of his fellow workers, the ability of his superiors and all extant scientific knowledge.

j) The management does the work for which it is best fitted and the men the work for which they are best fitted.

k) The best class of labor is attracted and held, and a lower class of labor can do a higher class of work.

l) The men are better contented, more interested in the work, in better health and a greater output per man is possible.

m) The various departments are so balanced that local congestion is replaced by a continuous pull from each department.

2 Material cost is reduced:
  a) By a systematic elimination of waste in manufacture.
  b) By a system of storage which reduces to a minimum:—
    1) Stock carried.
    2) Deterioration in storage.
  c) By a scientific selection of the most suitable material.

3 Overhead cost is reduced since intensive management means a greater output with the same labor force and equipment. The following charges are therefore divided by a larger amount and the cost per unit is reduced:—

a) Superintendence and general office,

b) Rent or interest on investment in land, buildings, machinery, tools and various sorts of equipment.

c) Taxes, insurance,

d) Depreciation,

e) Repairs,

f) Power, water, light, heat and ventilation.

Wastes of power, floor space, lighting, etc., are reduced.

Losses due to inaccurate cost estimates are reduced by predetermination of the costs of manufacture.

4 Competent management is continuously assured

a) Once a best method—either of doing the work of meeting a condition—is determined it becomes a permanent record of the company so that the expense of solving the problem does not have to be incurred more than once. Costly mistakes are not repeated and the concern ceases to be the personal experimental school of new executives.

b) The capabilities of various subordinates are more exactly determined so that the likelihood of mistaken promotions, which are costly, are reduced.

c) Trade secrets become the property of the company.

d) Faults, whether of men or managers, are automatically traced to their source.

e) Exact and definite knowledge takes the place of bluffing; this applies to men, foremen, superintendents and managers. Those who are incompetent are automatically forced out.

f) Unnecessary executive work is eliminated by the introduction of the exception principle which brings only abnormal conditions, but those forcibly to the attention of the management.

II Labor troubles are eliminated by scientific management.

a) Since the interests of employer and employee are made identical. The employee is benefitted directly in proportion to his part in lowering the cost of manufacture.

b) Men are not herded together in classes, and the payment of classes instead of men ceases to lead to collective bargaining, strikes, etc.

c) Mutual respect takes the place of mutual distrust since:—

d) The worker is insured a fair deal by scientifically and impartially predetermined rates. It is no longer necessary for the employer to cut rates, break his word, etc., and it is no longer necessary for the men to deceive their employer as to the amount of work which is possible.

e) Bluffing is eliminated on both sides.

f) Driving by the foremen is replaced by their interested assistance.

g) Blame is placed where it belongs.

h) Co-operation takes the place of the fight for advantage.

i) Labor is educated to habits of industry which lead to better habits of life, to contentment and happiness.

III An increased output is obtained without increasing the investment in real estate, plant or equipment, since the same labor force housed in the same buildings and using the same machines turn out a vastly greater product.

IV An improved quality of product is obtained by:—

a) Making it as much to the worker's advantage to produce quality as quantity.

b) Reducing the chance of misunderstanding in regard to the method of doing the work.

c) The elimination of dreaming over the work.

d) The abolition of strenuousness.

e) Scientifically determining the best adapted material.

f) Furnishing the tool and machine calculated to do the best work.

g) Concentrating the best knowledge of the best way to do the work in such a manner that it bears directly upon the work in hand.

V Prompt deliveries are insured by scientific management by means of

a) A storage system which reduces delays through lack of material.

b) Figuring systematically the time required for manufacture before making promises to the customer and then keeping the time allowed for making each part forcibly before the department responsible.

c) So sorting the material throughout the course of the manufacture that the parts are ready when wanted and in the order wanted in each department.

B—For the Employee

1 Higher pay is secured by scientific management since the workman is allowed to let himself out without fear of having his pay cut and consequently earns more.

He is assisted in this by having all obstacles to rapid performance removed, breakdowns reduced, material delivered promptly, and the proper tools furnished in the best condition. He loses no time hunting foremen for instructions.

The best method of doing the work is figured out for him so that in doing his work he has the advantage of the best brains and the best experience in concentrated form.

As a result he can pay his employer for having this done for him and still earn from 20 to 40% more wages.

II Shorter hours are secured in many cases although this is dependent upon the nature of the work and the established working day. Frequently scientific analysis of the work has resulted in a shorter working day, higher wages and an increased profit to the manufacturer.

III Steady employment is secured as a result of the elimination of labor troubles resulting in strikes and lockouts and in the reduction of shutdowns due to dull times by means of the wider market reached and by the advantage more efficient operation gives the manufacturer over his competitors.

IV-VI Less fatigue, satisfaction in work, education, etc., are made possible by the methods of scientific management. The work is analyzed, each motion is studied and is made as easy as possible. All unnecessary motions are eliminated, rest periods are introduced where necessary, conditions are lined up to assist the worker and where he is not physically or temperamentally suited to the particular work a transfer is made. The work is speeded to the point where it exhilarates, being neither fatiguingly slow nor exhaustingly strenuous.

The combination of pay in proportion to work, incentive for ingenuity, and clear and intelligent instructions, means less worry and greatest possible interest in the work.

Ambition is substituted as an incentive for the fear of discharge. The foreman instead of a driver becomes a friendly teacher. Co-operation is substituted for antagonism. Deception is unprofitable and hate is succeeded by mutual respect.

The worker's increased knowledge of his work, his acquired habits of industry, and his better ideals make him a better man, physically, mentally and morally which benefits him as well as the community.

C—To the Community

I-VI Scientific management generally introduced into the industries of a community means much to the community. The more good citizens, the greater is the benefit to all the citizens. There are fewer in jails and hospitals and the taxpayers are benefitted. The merchants are paid more promptly, there are fewer failures and lower prices. The banks are benefitted and new industries grow. New industries seek a community free from labor troubles. As the factories increase and grow money from a wider territory flows into the community and all prosper. Business becomes more stable. If times are dull in one section, the manufacturer may reach another market and the more industries a town possesses, the more is that town's prosperity insured.

If wages are increased without reduction of profit to the manufacturer he maintains his price and the employee can buy more of that produced for his increased pay than he could before he received his raise. It makes no difference whether he buys from his own or someone else's employer, he can get more for his money as long as wages can be raised without increasing prices. What you can get for your money determines whether the cost of living is high or low. Any system then which makes it possible for the manufacturer to profitably raise wages without raising prices reduces the cost of living to the community and to the nation.

ELEMENTS OF SCIENTIFIC MANAGEMENT

Scientific management combines, with the present best principles of management, among others, the following special features:—

1 Analytical time study—under which—

  a) The best practice is timed, one motion at a time and this is—

  b) Divided into—

    1) Necessary motions—(which are improved upon, following the laws of motion study).

    2) Unnecessary motions—(which are eliminated).

    3) Delays—(which are analyzed and as far as possible eliminated.)

2 Written instruction card—which combines—

  a) The results of analytical time study.

  b) The knowledge and experience of the men, foremen, superintendents, etc.

  c) The knowledge and science of the industrial engineer, mechanical engineering, the laws of heavy and light labor, of fatigue, of mental and physical fitness to tasks, etc., etc.

  d) And establishes the correct time for each motion.

3 Bonus for workmen—which rewards the worker for doing the work according to the instruction card, in proportion to his accomplishment. This usually includes day rate in case of failure and partial reward for partial success.

4 Bonus for foremen—and to all who assist the workman in accomplishing his task.

5 Centralization and specialization in all activities, comprising especially

  a) Despatching—Instead of sending each part along in a haphazard fashion, dependent upon the care of each workman or foreman, the matter of the movement of parts is concentrated in one department, or made the business of one man, who makes the movement of each part and its arrival on time his special study and is held responsible. This work covers also the arrival of material and supplies at the proper time.

  b) Routing—The shortest and most economical path of each part through the shop is studied and established and the responsibility for its following this route is fixed.

  c) Functional foremanship—Instead of each boss and foreman trying to be a "jack of all trades" each one specializes in some one portion of the work—covering more men but less subjects.

  d) Staff investigation—Certain problems requiring special study and development are turned over to one man or group of men. This would include a study of the best adapted tool for the work, the creation of new machines, the determination of the most economical material and the methods of rendering repair work permanent. Standards are established and the line organization is enabled to do each sort of work in the best way. The industrial engineer assists in this work and the results become a record of the company.

RESULTS OF SCIENTIFIC MANAGEMENT

Over 50,000 workmen in the United States are now employed under this system and they are receiving from 30 to 100% higher daily wages than are paid to men of similar calibre with whom they are surrounded, while companies employing them are more prosperous than ever before. The output per man and per machine has been doubled and there has never been a strike among the men working under the system.

A few examples of the application of the principle of scientific management to various industries follow:—

1 Pig iron handling: Unloading from box cars—Wages increased 69% ($ .16 to $ .27 per hour); output increased 500% (2 tons per hour to 10 tons); costs cut 66% (from $ .08 to $ .27 per ton). In Bethlehem Steel Co.'s yards, various movements—Wages increased 60% ($1.15 to $1.85 per day); output, 300% (from 12 tons to 48 tons per day); cost cut 60% (from $ .097 to $ .038 per ton).

2 Shoveling: Various materials in Bethlehem Steel Co.'s yards—Wages increased 60% ($1.15 to $1.88 per day); cost per ton reduced 54% (from $ .073 to $ .033). The saving the first year amounted to $36,000, the second year to $80,000.

3 Iron moulding—Wages increased 75% ($3.28 to $5.74 per man); output increased 265% (time cut from 53 to 20 minutes per piece); and costs cut 53% ($1.17 to $ .54 per piece).

4 Bricklaying: Union men averaged 350 brick per hour instead of 120, with less fatigue, making five motions instead of 18.

5 Riveting: Crew drove 731 rivets per day on structural work instead of 432 per day—an increase of 69%.

6 Cleaning boilers: Cost cut from $62.00 to $11.00 per set and work done more easily and more thoroughly.

7 Sulphate pulp mills: Output doubled, cost reduced.

8 Tobacco pouch factory: Girls averaged 550 per day instead of 275, an increase of 100%.

9 Bicycle ball factory: Wages increased 90%, hours shortened from 10½ to 8½, quality improved, cost reduced.

10 Pillow case factory: Wages increased 40%; production increased 33%; cost cut in half; imperfections per case cut from 47 to 2.

11 Cloth mill: Wages increased 40%; production increased 80%; cost reduced 60%; quality improved.

12 Foundry: Wages increased over 60% and cost cut 66% on big cylinder bushings.

13 Machine shop: Wages increased 17%; output increased 41%; cost reduced 60%.

Foundry and machine shop: Wages increased 69.2%; working day cut from ten to nine hours; and a saving of $120,000 per year effected.

The establishment of standards through staff investigation in certain shops has accomplished remarkable results, for example:

a) Standardized belting has increased the average life of belts sixfold, the belt failures are one-sixth and the annual cost is less than one-seventh what it was.

b) High speed steel in machine shops accomplishes from four to five times as much as ordinary steel.

c) Standardized abrasive wheels cut four times as fast as old fashioned ground stones.

d) Standardized files last four times as long and cut much faster.

Scientific management investigates every phase of a business using the scientific method, which eliminates the useless, improves the necessary and makes permanent the best; its results benefit the worker, the owner and the community.

EFFICIENCY SOCIETY.

FEB 6

Handling Men (Radford)

5-12-16

A paper presented at the monthly meeting of the Efficiency Society, April 27, 1916, by G. S. Radford of the Remington Arms-Union Metallic Cartridge Co.

Certainly no subject should be approached by the executive with more interest, or with greater enthusiasm than the one we have for discussion this evening; namely, "Handling Men."

At the same time, it is about the most difficult part of management to describe; because the problems of handling depend so much on the local circumstances—circumstances that are complex, variable and conditioned by the particular work in hand.

Everyone will admit that good management calls for a knowledge of the technique of the business as well as for a thoro appreciation of system and its uses; but more important still is the ability to select the right men for the work, to shape the assignment of work to fit the men available, and to obtain their co-operation. It may be stated at once that if you have at the head of an organization, a man who combines the necessary technical knowledge with the qualities of real leadership; and if that man is surrounded by capable department heads, foremen, and sub-foremen, then practically all questions of handling are solved. This statement might seem to be begging the question, but it is made to indicate the all important part played by the human factor in management.

If you will consider a large organization as a machine for doing a certain kind of work, you will note that the various departments, divisions, and subordinate groups of workers can be compared to the different parts of the machine. The work of the separate groups must be so interlocked, articulated and correlated, that all will work together smoothly in doing their share toward the orderly accomplishment of the main objective. System plays its part in assisting in this co-ordination. That part of system which relates to cost keeping measures the output of the various parts. The act of organizing, or distributing the work among the men available, is comparable to designing. It is for this reason, just as design is all important in engineering, that a definite and proper distribution of duties is a most important step in handling a large number of men.

Probably you are more interested in actual practice than you are in theory; so I shall now read the introduction to a written organization prepared for several departments of a large plant. This introduction embodies the things that the writer's experience has shown to be desirable to impress on a number of men who are going to work together.

> **1 The purpose of publishing this outline of organization is to definitely establish the division of duties and to secure co-ordination by providing a "chain of command", or flow of authority. The duties of each executive are assigned so as to insure undivided authority and individual responsibility within his own department. It is a cardinal principle of the management of this plant, that business must be conducted smoothly and harmoniously. There must be no waste of effort on account of friction. The efforts of all must be directed effectively toward securing efficiency in the work of the plant as a whole. This is a union of individuals for a common purpose.**
>
> **2 Observation of the following simple rules will secure the above mentioned result:**
>
> > **1) Deal frankly and courteously with your associates. When opportunity offers, help the other fellow to get results in his work.**
> >
> > **2) Differences of opinion and clashes in authority should be referred at once to your immediate superior for decision. When such a decision is rendered, it should be adhered to without further discussion. In special cases appeal to higher authority may be resorted to thru your immediate superior.**

> 3) Carry out the instructions of your chief promptly, cheerfully, and as efficiently as it is in you to do.
>
> 3 It will be noted from what follows:
>
> 1) That the work to be done is distributed among the following main offices. (Then follows a list of such offices, which is not pertinent to this discussion.)
>
> 2) That the work of each office is distributed among several departments or their equivalent; and these departments are separated further into sections and groups.
>
> 3) That a chain of command for effectively controlling the operation of the plant is established thru the fact that all principal orders and instructions emanate from the manager. These orders and instructions are then transmitted, interpreted and carried out by his assistants (the department heads, section chiefs, etc.) in accordance with the outline of duties that follows.

As stated above, this serves as an introduction to the detail written organization; and written assignments of work are always desirable when practicable.

It is well to issue such an outline in a convenient loose leaf binder. It can then be supplemented by a series of written instruction notices, to be filed therein as they are issued from time to time. Such instruction notices can be used for many purposes, not the least important of which is to make available in readily accessible form, all the information about the company's system and methods that a new man just entering the organization will need to know.

The use of committees is an excellent way to bring men together and thus to secure co-ordination and co-operation. Committee meetings should be carefully prepared for beforehand, and strongly handled, or they are apt to degenerate into mere arguments about trivial subjects, and thus become time wasters. There always should be standing committees on certain important subjects, preferably with definite meeting places at specified times, within *working hours.* Everyone realizes the desirability of having the men who are going to put into effect a new plan believe that it is their own scheme. Careful work in committee will secure this; as men who have themselves voted for a new scheme are pretty certain to try to make it succeed.

Early this year one of the largest shipbuilding concerns in the country sent out a committee to investigate employment, safety and welfare work in some twenty companies, employing from 600 to 42,000 men each. The committee report is interesting, particularly as it probably will not be published. It states, among other things, that the five reasons given by these companies for a reduction in their labor turnover are, in the order of their importance:

1 Wages
2 Fair treatment
3 Promotion
4 Good working conditions
5 Welfare work

This arrangement of headings may be taken as a fair statement of general experience in handling men. The subject of wages calls for little discussion, as it has been written up too much, if anything. Being the basis of the economic relationship between employer and employee, it is naturally the first thing that men consider in choosing a place to work. I once asked a most successful manager (who had reduced his labor cost 40% in five years) to what he principally attributed his success in handling men. He replied: "I endeavor to pay them for what they do. That is all there is to it, isn't it?"

Fair treatment is naturally the next thing to be considered after wages, for it implies so many things of vital interest to the individual, and so deeply affects his peace of mind. The report just referred to contains a statement of special interest in this connection. A company employing 10,000 men informed the committee that the establishment of a court of appeal for their workmen cut down discharges by a most unexpected amount. This bears out the experience of many concerns, that one of the best aids to contentment is the knowledge that the company means to see that its employees shall be treated honestly.

Nearly all men will answer to fair treatment.

I recall a case where even a misunderstanding was turned to secure co-operation by the way in which the men were handled. The case occurred in a plant, and in a shop in that plant, where labor had been restless for some time. The plant was one of a chain of similar works. Several years before, the central office sent out a new set of standard forms, time cards and the like, with orders to put them into use. In the shop in question the time was ill chosen, and the next morning about 500 men declined to go to work until they knew more about the new "card system", as they called it. The superintendent was sent for. He came down with a big dog at his heels. Just as he stepped up to address the men, the dog got in his way. He said, "Down, Sir! I'm master here." Then he talked for some minutes, and the men struck.

That experience, followed by various changes in system work, was the preparation, if it can be called that, which preceded a reorganization some years later. You will readily understand that the sample of bad management just related, made the managing of the plant, and of that shop in particular, a ticklish proposition. Within a month after the new management took hold, an accident happened. A clerk was told to make up a new directory of the men. He chose the easiest way, and without the management's knowledge, sent the foremen a set of forms for the men to fill out, and there were a good many personal questions on those forms. The next morning the shop superintendent of the plant received a letter from the men, thru the foreman, that gave him something to think about all day. He took advantage of the opportunity to gain the goodwill and confidence of the men by sending for their committee and telling them that he was delighted, for once in his life, to find a shop where the men took an interest in the system work. He explained how forms are needed in a big plant to control the work, and how the men could help him by making the system work a success; also that he'd be glad to tell them at any time what he was trying to do in the way of such work and why. Then, when they were quieted down, he told them how the particular form that had caused the disturbance was a scheme gotten up by a clerk to save himself trouble, and they could help out the clerk, or not, as they chose. The men held a meeting that night, and sent the superintendent a letter thanking him for his courtesy, and promising their co-operation. The men who struck four years before under somewhat similar circumstances were willing to meet him more than halfway. They answered to fair treatment; and barring accidents, they always will.

Promotion for merit is really a part of fair treatment and is the part of common sense in management. The best men will go where they are given a chance to advance themselves

There is a certain technical bureau in the Navy department that can always have the pick of the civil service employees. Men try to get the vacancies there. Why? Because they know that if they prove their worth they will be promoted, or else have a chance to take an advanced position in some outside concern.

Promotion from the company's force to fill vacancies, rather than bringing in outsiders, is an accepted policy in more and more concerns. Such a policy requires that men be in training for jobs higher up. Sound organization calls for understudies for all positions of responsibility anyway. Further, good management has in it an element of *teaching* such men to fit them for their work. The spirit of helping men to help themselves is one that should be cultivated thruout the plant. Encourage men to be ambitious. They are an asset.

Another good and growing practice that we may well consider at this point, is that of giving the man who has failed on one job, a chance to make good in some other part of the plant. It is a fact that nearly every man is good for some particular kind of work. Of course you must except the habitual drunkard, the dishonest, the trifler, and the trouble maker; but even among these there is sometimes a chance if you can *interest* the man, and develop the pride of personal achievement and the pleasure and interest of good craftmanship.

It is only good business sense for the management to provide a clean and comfortable place to work. So much depends on systematic and orderly arrangement of the working space that there is no excuse for not keeping a shop unencumbered. One of the first things, if not *the first* thing, to do with a run down shop, is to clean it out. Tell the foreman to clear out everything not used in the business. When he says he has done so, go thru the shop yourself and have all the unnecessary furniture, signs, locker doors, drawers, and shelves removed. It is a curious fact that just as sure as a stow hole is available it will be filled, usually with junk. A plant consisting of several detached shops cleared $5,000 on such a clean-up, over and above the cost of putting the place in order. The principal gain, however, is thru the influence on the personnel.

We hear a good deal nowadays about the importance of the arrangement of machinery, so that there will be a direct flow of material thru the shops. It is equally important that the machines and working places be arranged with an eye to the convenience and comfort of the men. There is no general rule for this, and there is room for considerable thought in working out each case. A sensitive drill whose table is fed up by a foot treadle, calls for a stool for the operator. A man who is using a file should stand up. He will do so naturally if he is paid on piece work, but will sit down just as naturally if paid by the day.

Environment plays a very large part in influencing the spirit and attitude of men, as all of us have found out while trying to work in the old-fashioned, dark, stuffy or cold office. A good *general* lighting system is a splendid cure for a "blue" Monday morning. Even if it is light enough to work without artificial light on a chilly, rainy day, switch on the light and watch everyone cheer up and "get busier".

When it comes to the question of beautifying factory grounds, we begin to enter the domain of welfare work, which I understand is reserved for later discussion. It bears a certain relation to the matter of pleasant working conditions, however; and it may not be amiss to give an example here of the influence of surroundings. There is a shipyard here in the East employing several thousand men, and strikes have not been infrequent. A short time ago it changed hands. The new management began by cleaning up the yard, and just inside the gates where the men entered, they replaced a mud hole with a beautiful bed of flowers. Now there are all sorts of men employed in a shipbuilding plant, on account of the great variety of trades. Many of them are used to specially severe work with not very high wages. It takes hard men to work out of doors on steel in the winter. There is an element of pathos in the fact that the day this flower bed was put in, the men congregated about it on their way out, and *cheered*.

Among the many things that must be considered in connection with handling men, is one that is unusually difficult to discuss—probably because it involves much that is personal and intimate. I refer to the personal relations of the executive with his workers. If you read the lives of Grant and Lee, you will be struck again and again with the fact that they took a deep and kindly interest in the welfare of their men. Their leadership did

not depend only on the respect that their professional ability and the power of their rank demanded.

Many of us have been impressed by the spirit that seems to pervade the 150,000 workers of the American Telephone and Telegraph service. The reason is plain to see in any recent annual report of that company, bearing at the end, the signature of Theodore N. Vail.

Not long ago Mr. Schwab bought a large plant, and soon afterwards made a personal inspection of the shops to meet and shake hands with the foremen. That alone showed that he understood handling men. The story is told that on this trip he went thru a shop whose foreman was a little Irishman. The foreman was efficient and his shop showed it. As Mr. Schwab went out he said, "This is fine, it's good! I tell you, Mike, we Pennsylvania Dutch are *all right*, aren't we?"

It is not given to every executive to have that personal magnetism that borders on genius in handling men; but certainly everyone can have the friendship and respect of his men, if he studies them and their interests with real and genuine sincerity. When you have a new scheme to put into effect, consider it from the workman's standpoint. He may be part of a machine in one sense, but he nevertheless is a man, with all the perfectly natural limitations and variable feelings of a human being. I venture to say that there is nothing in the entire field of management that will yield so large a return, both in actual accomplishment and in personal satisfaction, as the study of the men themselves.

6

The Need of Efficiency in Government (Hugo) 10-30-16

Address of Hon. Francis M. Hugo, Secretary of State, Albany, N. Y., before Efficiency Society Convention at Lake Placid Club, September 17–19, 1915.

The civil administration of the state, county, town and village government in the commonwealth of New York is conducted by a large army of permanent officials, presided over, in each important department, by a member or members of the administration for the time being in power. The total number of these employees in 1914 reached 244,310 persons, not including those engaged in police, lighting or drainage works, or those employed by the Federal government, which aggregated many thousands more. In nearly every department, temporary or elective heads preside, but in all of them there is necessarily a great preponderance of mechanical and routine work conducted under regulation and direct supervision, which requires fidelity for its efficient discharge, but presents no scope for the exercise of any intellectual power.

Side by side with this labor, however, and directing it, there is much work of a responsible character varying widely in amount in different departments, which demands a high order of intelligence and discretion for its due performance, and upon the way in which this work is discharged depends whether or not the public service is conducted with credit and efficiency. But the administration of the government is very different from the administration of a large business or the affairs of a great public enterprise, with which it is often, without due consideration, compared. Much of the mere mechanical and routine work in the public service is necessarily similar in its character to the same description of work in these undertakings, but the scope of governmental administration is altogether different and wider.

The object of every business and public company is to make profit and the test of its administration lies in the result disclosed by its profit and loss accounts. In the public service, on the contrary, it is absolutely impossible, except in a very few instances, to apply the test of measuring the work done by the results expressed in money value. Nor is it by any means the case that money results are the end and aim of public administration. The functions of government take a much wider range. They include the protection of our interests and the maintenance of our credit at home and abroad and the raising and expending of the necessary revenue to meet these objects as well as the thousand and one directions in which the state takes the individual members of the general public under its protection and looks after their safety and well being.

Sometimes it does this in conjunction with the local authorities and in this category comes education and aid to local police, etc. Sometimes the state exercises a control by means of specially appointed agents over undertakings or industries, such as railways, harbors, mines, factories, gas and waterworks, whose operations may be so conducted as injuriously to affect the interest of the general public or imperil the safety of those engaged in it. Moreover, not only has there been a large extension in recent years of this direct administrative action on the part of the executive government, but there is a constantly increasing demand on the part of the influential section of the public for further extension of state interference in all sorts of direction. This, coupled with the growing power of the press, and of its influence over administration generally, as well as the more searching criticism to which administrative acts are subjected, makes it essential that those who take part in conducting the administration of the state's affairs, should be abreast with the times and be men of liberal education and breadth of view.

Again, much has been said of late about the need of increased economy and efficiency in the management of these public affairs. Generally speaking, every elective officer is charged with any action taken which may result in waste, whether this be from the character of the purchase made or the character of the work performed. Besides, a person who enjoys the confidence and respect of his fellows, who has attained marked success in the management of private affairs, when elected to office, finds himself without the means of knowing what is being bought, what price is being paid, whether the thing purchased is adapted to use, whether the employees are efficient or inefficient, faithful or faithless, or finally what is the relation of cost to result. In fact, the whole plan of governmental organization has usually been on a plane of personal relation and ignorance instead of a system of scientific management and intelligent co-operation.

Thus, it may be said that both governing agents and citizens of the state have been without any conscious constructive program of government and under such circumstances it goes without saying that the affairs of state have not been scientifically managed or intelligently directed or controlled. Very few private corporations have undertaken to finance a business which places a greater burden of responsibility on the management than does the state government, yet the officers elected, who direct and control the business of our government, are handicapped in a manner that would at once mark for immediate failure the management of a private corporation.

When so inadequately provided with instruments, what is more natural than that those who, by reason of their previous successes, have been honored by electors with positions of public trust, should and often have been retired, discredited, and under such circumstances what else is to be expected than that the voters, who have elected men to office, finding them discredited, should turn to others who make new promises, but who when elected themselves become quite as helpless as their predecessors? But not only as officers, but also as citizens are we interested in placing in the hands of state officials such instruments of precision as will enable them to have the same basis for intelligent direction and control, the same means of protecting responsibility and for "making good" for the benefit of the public as they had when working for the benefit of private stock holders.

In conclusion, it may be said that notwithstanding the splendid and numerous plans suggested for making government management intelligent and for making government agents responsible and responsive, New York State has suffered more from ignorance, irresponsiveness and irresponsibility during the last half century than other commonwealths; furthermore, the welfare of the people has not been carefully guarded; the entrusted estate has been wasted; the activities of government have been inefficiently managed; the powers of government systematically prostituted to private and partisan ends. But we must not continue to be behind the times. The social view of governmental activity is prevailing everywhere and it is the duty of every governmental official, in fact, his primary task, to be efficient as well as honest in his management of the people's affairs. Waste defrauds as much as graft, extravagance as much as theft, for it is not enough to-day that the public servant shall be good, he must also be good for his job. He must give efficient service, and, not only that, he must keep the cost of his service within the bonds of standard business economy.

Sales Efficiency Committee.

12-4-15

SYMBOL: SE.

TASK:

(a) To gather and investigate ideas and information pertaining to selling, salesmanship and sales management.
(b) To formulate plans and methods for increasing efficiency in selling, salesmanship and sales management.
(c) To prepare reports on subjects for bulletins to go to general membership.

PERSONNEL:

To consist of a chairman, vice-chairman, secretary and eight other members, with affiliates consisting of those members of the Society who are willing to co-operate with the work of this committee, all to be chosen from members expressing special interest in this subject.
The committee may recommend the addition of other members as occasion makes desirable.

METHODS:

(a) Stated meetings for conference, discussion and criticism.
(b) Queries to own members, Society members and outside sources.
(c) Assignment of definite detail investigations to each individual member of committee.
(d) Regular order of business to be followed in meetings.
(e) Minutes of meetings to be sent regularly to members and to contain notification as to specific subjects, time and place for succeeding meeting.

Society Affairs

1-1-6

ACTIVITIES

Last July you appointed this Committee to carry out certain work, and left to its judgment the question of whether to continue the activities of the Society under the present organization after January 1, 1916, or to form a new Society.

Your Committee has directed this work as indicated by the monthly reports sent you, to which we would add the following covering operation during December:

Journal

The December issue has been distributed and the January issue contracted for and now in hands of the printer.

Meetings

A profitable and enjoyable meeting held December 16, and provision made for an exceptionally informative meeting for January 21.

Bulletins

MCB-1, SEB-2 and FEB-2 issued during December.

Government Work

The agitation of the question of the worker's attitude toward scientific management and other efficiency methods has been continued and is being taken up by various bodies all over the country, many of our members taking a very active interest in the matter.

Organization

The question of the retention of the old organization had your Committee's careful study after which we unanimously recommended the adoption of the resolution subjoined. The adoption of the resolution by the members at the meeting of December 28, provides for carrying on the work under a more flexible and responsive organization. The constitution and by-laws of the new Society is essentially the same as that recently submitted for your consideration with minor modifications suggested by members. This places all members except students in the class of active members until sufficient time is afforded for the drafting and adoption of more definite qualifications for the other classes.

The officers to serve until the election on January 21 are: President, Melvil Dewey; Vice-President, Joseph French Johnson; Treasurer, W. J. Coward; Secretary, A. W. Kimber; Trustees, W. J. Coward, W. Herman Greul, W. R. Hayward, Fred Hawley, A. W. Kimber, Ward Melville and Winston Paul.

The prompt remittance of dues will greatly assist planning and scheduling of the work for 1916. The importance of the effort to bring out the facts about the effect of scientific management on the worker cannot be overestimated and your promptness will prevent a curtailment of this work.

FINANCES

Budget Report

Purpose	Appropriated	Budget	Budget Cr.	Budget Dr.
Clerical work....................	$ 13.00	$ 12.00	—	$ 1.00
Stationery	20.75	12.00	—	8.75
Journal printing.................	88.00	80.00	—	8.00
" Postage	8.17	7.00	—	1.17
Bulletin printing	231.50*	40.00	—	191.50
" Postage	21.38	24.00	2.62	—
Postage, Secretary	10.00	18.00	8.00	—
" Editors	3.00	3.00	—	—
" Committees	12.20	6.00	—	6.20
Incidentals	132.02*	10.00	—	122.02
	$540.02	$212.00	$10.62	$338.64
	212.00			10.62
Budget Dr. December	$328.02			$328.02
" " November				13.20
" " to date............				*$341.22

* NOTE.—Bulletin printing includes $100 for extra copies for which we have been reimbursed. Item for incidentals includes expense for meeting notices, organization of committees, legal services, etc.

Committee Treasurer's Report

Total receipts to December 1	$1,133.96	
December receipts	396.89	
Total receipts to date		$1,530.85
Disbursements to December 1	802.80	
December Disbursements	442.67	
Total Disbursements to date		1,245.47
Cash balance to date		285.38
Appropriated but not expended		142.75
Cash balance available		$142.63

MEMBERS' COMMITTEE.

RESOLUTION

WHEREAS, at a special meeting of the members of The Efficiency Society, Inc., held at the rooms of the Merchants' Association, Woolworth Building, New York City, on the 21st day of June, 1915, at 8 P. M., for the purpose of considering the affairs and prospects of the Society, and what action it would be best to take in respect to a new Constitution and By-Laws and revision of the provisions for budget and revenue and the continuation of the corporation or the abandonment of it for a more flexible and less formal organization; and

WHEREAS, at such meeting a Committee was appointed known as the Members' Committee, who were instructed to consider these matters and bring in a report upon the same, the manner of collecting funds and carrying on the work of the Society; and

WHEREAS, such Committee reported at an adjourned meeting of the Society at the rooms of the Merchants' Association, Woolworth Building, New York City, on the 19th day of July, at 4 P. M., and such report was, after discussion, accepted and adopted, and the Committee was ordered further to be continued for the purpose of providing funds to carry on the work of the Society, with instructions to carry on the said work of the Society for the remainder of the year 1915, and to prepare a new Constitution and amended By-Laws for presentation at a later meeting of the members of the Society, and to make final recommendations concerning whether the corporation should be continued or abandoned, and to take such further and other steps to carry out the plans so determined upon as might seem to them in their discretion advisable; and

WHEREAS, at this, a special meeting of the members of the Efficiency Society, Inc., held at the rooms of the Merchants' Association, Woolworth Building, New York City, on the 28th day of December, 1915, at 8 P. M., said Members' Committee has made a report showing that it has raised and provided funds to carry on the work of the Society during the aforesaid remainder of the year 1915, and has paid all bills connected with the same, and that it has so carried on the said work of the Society during the said period, and also that it recommends a more flexible and efficient form of organization for the members of the Society desiring to carry on the work of promoting efficiency, the study of efficiency methods and investigation of efficiency problems, to wit: that the Efficiency Society, Inc., be abandoned, and that the Board of Directors be instructed, after providing for the payment of all and every obligation of such corporation, to proceed to take such steps as are necessary or convenient to dissolve such corporation, and that the members be recommended to continue their membership in a voluntary, unincorporated association, preferably to be known as "Efficiency Society," which will carry on the work of promoting efficiency, the study of efficiency methods and the investigation of efficiency problems, which was commenced by and has hitherto been carried on by the Efficiency Society, Inc., accepting all of the members of the corporation as its members, free from the payment of dues until the expiration of the year for which dues have already been paid; and,

WHEREAS, pursuant to the instructions of the members of the Efficiency Society, Inc., according to resolutions adopted by the members of said Society at their special meeting aforesaid held at the rooms of the Merchants' Association, Woolworth Building, New York City, on the 19th day of July, 1915, at 4 P. M., the Members' Committee and the members thereof have caused a voluntary, unincorporated association to be formed under the name of Efficiency Society, which has offered to receive and accept the members of the Efficiency Society, Inc., as its members without further payment of dues or other financial obligations up to the expiration of the year for which they have respectively paid dues, and to furnish them the facilities, advantages and services of such voluntary, unincorporated association known as Efficiency Society, and to continue under such form of organization the work commenced by and continued up to this time by the Efficiency Society, Inc., provided that a list of such members with information as to the expiration of the year for which they have paid dues and such other information as may be necessary and convenient in order to conserve such membership is furnished to the voluntary, unincorporated association, provided the Efficiency Society, Inc., shall assign, transfer and set over to such voluntary, unincorporated association all its right, title and interest in and to the magazine known as the Efficiency Society Journal, provided the Efficiency Society, Inc., shall vote to dissolve the corporation and to instruct its Board of Directors to take such proceedings as may be necessary or convenient to effect such dissolution, and provided that the Efficiency Society, Inc., shall give its consent to the continued use and adoption of the name "Efficiency Society" by the voluntary, unincorporated association without prejudice or interference.

NOW, THEREFORE, BE IT RESOLVED: That the report of the Members' Committee and its recommendations are accepted and adopted as the act of the Efficiency Society, Inc., and as the declaration of its policies and purpose in the matter; and

BE IT FURTHER RESOLVED: That the action of the Members' Committee in recommending the abandonment of the corporation be and the same is hereby approved, accepted and adopted, and that the Board of Directors are hereby instructed to take such proceedings in due time as may be requisite to effect the dissolution of the corporation; and

BE IT FURTHER RESOLVED: That the action of the Members' Committee and of the members thereof in organizing a voluntary, unincorporated association under the name "Efficiency Society" to carry on the work commenced by and continued up to this time by the Efficiency Society, Inc., of promoting efficiency, the study of efficiency methods and the investigation of efficiency problems be and the same is hereby approved, ratified and confirmed, and that the Efficiency Society, Inc., hereby consents that the name "Efficiency Society" taken by said voluntary, unincorporated association be so taken and continued as its name, without prejudice or interference on the part of the Efficiency Society, Inc., or in its behalf; and

BE IT FURTHER RESOLVED: That the Efficiency Society, Inc., accepts the offer of the voluntary, unincorporated association "Efficiency Society," to receive and accept the members of the Efficiency Society, Inc, as its members without the further payment of dues or other financial obligations during the period for which their respective dues have already been paid, and to furnish to such members the facilities, advantages and services provided by its by-laws or furnished to its members in the promotion of efficiency the study of efficiency methods and the investigation of efficiency problems; and

BE IT FURTHER RESOLVED: That the Efficiency Society, Inc., hereby transfers, assigns and sets over unto the voluntary, unincorporated association Efficiency Society, a list of its members with their last-known post office addresses and the dates to which their respective dues have been paid, together with all such other records, documents, books and papers which may be requisite or convenient to enable the voluntary, unincorporated association Efficiency Society to supply to the members so taken over, the aforesaid and other benefits and advantages of membership; that it hereby transfers, assigns and sets over to the voluntary, unincorporated association Efficiency Society, such portion of its funds as will represent the proportion of said members' dues already paid, accruing for the period from the date of this resolution to the date or dates to which the said dues have been paid, as aforesaid, and any dues hereafter received; and that it also transfers, assigns and sets over unto the voluntary, unincorporated association Efficiency Society, all its rights, title and interest in and to the Efficiency Society Journal; and

BE IT FURTHER RESOLVED: That in conformity with the foregoing resolutions and determination of the members of the Efficiency Society, Inc., at this special meeting, the Corporation The Efficiency Society, Inc., is hereby dissolved, such dissolution to take effect upon the day when the Board of Directors of the Society, subject to the instructions hereinbefore given, shall have effected such dissolution under the law; and

BE IT FURTHER RESOLVED: That for the better performance and completion of the intentions and determinations of the members of the Efficiency Society, Inc., as hereinbefore set forth, the said members of the Efficiency Society, Inc., hereby constitute and appoint as their agents the aforesaid Members' Committee to take whatever other action they may deem necessary or advisable in the premises; and

BE IT FURTHER RESOLVED: That the Efficiency Society, Inc., votes its thanks to the Members' Committee for their arduous and valuable labors in preparing reports upon the condition and prospects of the Efficiency Society, Inc., providing revenues for the continuation of its work and keeping its budget within such revenues, and for carrying on the other work of the Efficiency Society, Inc., in an efficient, satisfactory and successful manner, and for providing through its two reports to this Society for plans and methods for the continuation of the work which it has been determined could not be successfully carried on under the corporation, the Efficiency Society, Inc., but which may, with assurance of success, be carried on to advantage by the voluntary, unincorporated association, Efficiency Society, to which the membership list is transferred.

The Business Man's Intellectual Life (Calder)

2-28-16

An address delivered before the Efficiency Society by John Calder, Mem. Am. Soc. M. E.,
president of the Manufacturers' Equipment Co., Boston, Mass

The business man's intellectual life: its necessity, its neglect, its relation to books, its rewards, its demand for discrimination, its pursuit under difficulties, its nature, its use of imagination, its influence on conduct, its effect on character, its social value, and its future.

Its Necessity

There are two main things of interest about a man—how he earns his living and how he thinks about the ultimate problems. An efficient society is concerned with the quality of both its individual and co-operative doing and thinking and the business man is an important asset.

Business ability consists more of the non-specialized faculties—imagination, judgment, promptness, resource, accuracy and steadfastness, than of the specialized skill and aptitudes which satisfy the lower grades. Because of this, business ability is always at a premium. It moves with greater ease than any other, horizontally from one occupation to another.

The *quality* of the business man's thinking and mental furnishing has much to do with his social efficiency, true success and happiness. Gainful occupations, however, do not furnish sufficient ground for the cultivation of the intellect. We find normal, industrious people full of opinions, most of which they merely *think* that they think. How to transmit the force of individual opinion and preference into public action is the most difficult and momentous question of government. Yet there is a previous question: How can we promote forceful and competent convictions on social questions? This is an age in which emphasis is laid upon the efficiency and success of what a man does, but it is also an age of super-specialization, with the result that business success does not necessarily imply a cultivated mind or an adequate appreciation of the ultimate problems of life. Yet service to society and sound thinking are so related that if a man is a drone it usually matters very little what he thinks about these questions.

This discussion is a plea for a genuine intellectual life on the part of every individual and for the bringing of receptive and constructive imagination into human intercourse; for imagination is not, as many people believe, a process of the mind which deals chiefly with unrealities and impossibilities. The call to-day, national and international, is for broader knowledge, wider sympathies and intelligent action, and these can only result from the reflections of minds fed on something else beside the strategy and tactics of the market place.

Various reasons have been assigned to account for the relatively small proportion of the people, especially in the large cities, who choose to participate directly in the control and betterment of our vast community interests. Too often the cynical "What are you going to do about it?" is the torpid citizen's discouraging response to an appeal to his civic conscience. Even though we meet him nowadays with a practicable program, instead of mere criticism, he is difficult to interest.

In addition, the efficiency factor of actual participators in social control is low, and we are confronted with an anomaly, viz: the greatest material, industrial and business development the world has ever known, and for which the keenest intelligence is constantly available, side by side with notorious inefficiency in many departments of self government and self culture.

The chief reason, I am convinced, is that the majority of business and professional men are living at such a pace and on such a restricted mental plane that they are content to let social obligations drift. Investigations and social crises lift matters from time to time to higher levels from which they never wholly recede, but steady progress in these things depends to a large extent on individual improvement, on growth in personal character.

There is, I believe, a mine of social helpfulness in the efficient business man if his attention can be secured, his interest aroused, his imagination touched and his will enlisted. The direct propaganda for these ends is the object of many conferences. I have undertaken, however, to indicate, not the good seed which must be sown, but the fruitful soil which should be prepared for it in the minds and hearts of every one of us, and particularly among the able authors of our present material prosperity, through the deliberate cultivation of intellectual habits.

We must not be afraid of the word *intellectual*, although I have often wished that some less formidable term were in circulation. It has no necessary connection with a fastidious and unpractical dilletantism or with a high brow aloofness from the man in the street.

In its essence the intellectual habit is at the root of all true democratic feeling, and there can be no real democracy unless the units that form it are educated to a point where not only personal interests, but the interests of the whole community can be calmly considered. Only by the aid of that for which it stands can we proceed with reasonable certitude from the known to the unknown and from the present to a better future in personal and social experience.

With this brief outline of my purpose in going to the source of personal effectiveness and discussing here the business man's intellectual life, let me sketch the conditions we observe as to individual mental and social inefficiency and suggest in some degree its causes and the remedies.

Its Neglect

Taking a general view of our topic in the first place, it is, let me repeat, a matter of note that many of our business and professional men are socially uninterested and personally uninteresting. Though keen followers of their own avocations for gain, they contribute little to the common stock of ideas. Willing to be entertained, as lightly as possible, by the efforts of others, they are dull and unresponsive in their leisure and exhibit but slight interest in intellectual topics and social service arising therefrom. The tired business man is catered to, at huge expense, in many ways not intellectual, but he often remains tired so far as his leisure is concerned. His civics and politics are carelessly delegated, but his neglected self culture cannot be attended to by proxy.

It is the tragedy of many a so-called successful career that the man has neglected to secure an adequate share of the durable satisfactions of life and that he can neither endure his own society nor contribute his portion of helpful human intercourse. The mental poverty of the average technician also is constantly in evidence and is one of the main barriers to his executive advancement.

The fine art of conversation always languishes amongst a people where solid reading and the reflection that should go with it are neglected.

It is an unfailing measure of culture to note in any company of people with whom you may be cast for some time, after the ordinary conventionalities of conversation have been dispensed with, the extent to which each individual naturally talks about things and persons or ideas and principles. Almost invariably the man who has left culture out of sight clings instinctively in his leisure to the concrete and the measurable which form his little world and exclude all higher enthusiasms. It was a college graduate with his commencement well behind him who, after being offered, in vain, conversational openings in art, music, the drama, sport, sociology and the weather, turned to his lady companion and said encouragingly, "Try me on leather; that's my line." It was certainly no leader of the intellectual life, though a science graduate, who, in listing a few books which he had inherited, made these two entries:

Mill—On Logic
ditto—On the Floss.

Nor is it surprising that the undergraduate who defined Nebuchadnezzar as "a prophet noted for his foretellings" should also be found laboring under a deep conviction that "Sodom and Gomorrah were man and wife."

With these examples of adult mental inefficiency before us, we are, naturally, not unprepared for the graduating high school student who defined "affability" as "the state of being insane on one subject only," and for the grammar school girl who declared that "an anesthetic is a person who does not believe in God."

Perhaps the palm should be awarded to the boy who wrote "bigamy is where a man tries to serve two masters," and added, "celibacy is when a man's single; the opposite of this is pleurisy."

Another boy stated that "Henry W. Longfellow was born in Portland, Maine, while his parents were traveling in Europe." We need not follow the inefficient start which the mind often makes in the lower grades where the young idea is not always taught to shoot accurately, to see, to perceive and to apperceive. Though deeply interested professionally in the practical control of labor and in its efficiency, I wish here to emphasize the fact that, in spite of the present trend toward early vocational training, the trained mind is much more important than the trained hand and the lack of the former in the adult is almost beyond remedy. Its inefficient development and direction accounts largely for the absence of a taste for the best books and the ignorance about and indifference to some of the world's greatest and most accessible literary treasures.

I hold, however, no brief against our institutions of learning, which well deserve our whole-hearted and intelligent support. The college and the school can give merely the apparatus of culture and a little, a very little, practice with it. They should do that well, but they cannot reasonably be expected to do anything more. To say nothing of the conflicting claims of modern studies, the human material on which teachers work is not yet ready for the mold of form and the choice of vocation which later on settle a man's opportunities for self-culture. Education is never finished and deliberate self culture must follow the conclusion of formal instruction if a man is to acquire mental reserves. Hence, when we graduate in the school of life, if we allow these intellectual weapons with which we were furnished to grow rusty through disuse, and find ourselves and others uninterested and uninteresting with regard to the best things and to social intercourse of a high order, we have ourselves, not our schoolmasters, to blame.

Its Relation to Books

In the intellectual life we have friendships of inestimable value; friendships that are a rest to our bodies and a solace to our souls. Some of these come through frequenting the society of the like minded, and the company we keep will settle many things which we would fain believe are still in our own control. Our voiced opinions in debate on many topics may be worlds apart, but, provided we really hold opinions, not prejudices, by an intellectual process, our very differences lend zest to our intercourse and increase mutual respect.

We also bring to each other's society a great company of invisible friends whose acquaintances we have made through the instrumentality of books. Here, even, in this western land, in the new world, the worthies of every age come to our homes, travel with us on distant journeys and abide with us wherever our lot may be cast.

It was an author of great excellence who deplored his unfruitful youth in these lines:

> For I was ever commonplace,
> Of genius, never had a trace;
> My thoughts, the world have never fed,—
> Mere echoes of the last book read.

Yet, if that last book were a noble one and were preceded by many of its kind, how greatly our social life would be enriched even by the echo of its ideas!

The starvation of the mind which is characteristic of multitudes of our people is well illustrated by two young women, overheard discussing what they should give a friend for a Christmas present. "Give her a book," said one. "No," replied the other, "*Don't* give her a book. She's *got* a book."

To-day the contented possession of one book is usually the equivalent of none, for the divine discontent, the awakened mind reaching out to possess its kingdom will not be denied many books.

Nevertheless on restricted intellectual tools with a keen edge many a mind has been cultivated.

The boy of forty years ago whose week-day leisure was scant and whose religious upbringing confined him on Sundays to two sermons, Sunday-school and three books—the Bible, the Pilgrim's Progress and the Catechism—is not in the least to be pitied in comparison with the boy of to-day who, with great libraries at his disposal, is engrossed in the comic and sporting supplements of our huge newspapers, varied with moving pictures by way of passing the time.

No, the boy who is at home with the historical books, the heroes and spiritual aspirations of the Hebrews; who has walked with Greatheart and who has sensed the "divinity that shapes our ends, rough-hew them how we will" has all the advantage and would be the first to profit by the greater privileges of to-day.

Its Rewards

The true mastery of even *one* of our great books is priceless and our wisest educators, realizing the futility of imposing the dead languages upon the mass of the people, are now concentrating upon the Bible—"that well of English undefiled"—to accomplish the vital task of upbuilding character which is now being thrust upon the schoolmaster by the indifferent and inefficient parenthood of the twentieth century.

The man who wrote a friend "You may send me the complete works of Shakespeare, Goethe and Emerson—also something to read," whatever his faults, was no hypocrite.

On the other hand there are untutored thousands who "needs must love the highest when they see it."

Such an one was the Australian squatter who had made his pile but had not bartered his soul for it and who asked a friend to send out some books to him in the bush. A box containing the very essence of English literature was dispatched and the friend was rather disappointed to receive merely a postcard acknowledgment of its arrival.

But a year afterward he was rejoiced to find a brief yet significant letter from the squatter. "Have been reading over the books you sent," it ran, "and if anything new has been written by William Shakespeare or John Milton please send it out." We smile at his ignorance of literary history, yes, but this bushman knew what he *liked*. He had the root of the matter in him. Turned loose without a guide in the great field of letters, he had fastened instinctively upon the two greatest classics of English literature.

Its Demand for Discrimination

The fact is that a comparatively few immortal books have concentrated in them the chief ideas of the ages. To know them truly is to be educated and each age merely alters a few accents.

If Emerson's two series of essays were as much a part of your consciousness as your lunch hour, you would be richer far than many a one with bookshelves groaning under *de luxe* editions of uncut edges.

We should *own* our prized books and be able to go back to them in different moods and to refer to passages deeply incorporated in our thinking. Such books should be chosen as a man chooses a wife—because of certain inexplicable reasons felt to be adequate at the time. The rule for reading is simply "Read the books that please you." Only *such* books will ever really belong to you. We should all get the book-habit to counteract the breathless haste of these days and the flood of printed matter which merely kills time. Not books *about* books, remember, or the reviews, summaries or tabloids patronized by lazy people, but the book itself—all that some great mind wrote to express itself. Modern journalism has done for the people what education failed to do. It has made reading *almost* universal, but it is so framed that it demands and obtains the dissipation of our attention on widely scattered things of passing interest.

Used as it to-day by many as a substitute for all solid literature, the newspaper really undermines the power to read. It develops a special mental habit of flitting over areas of print with ample intelligence perhaps, but with a loose attention that blunts the instinct of appreciation and robs a man of the power to recognize the best when he sees it. Even book reading alone will not determine the quality of our intellectual life. Many book readers are mere sieves. Everything seems to run through their minds and memories. They read neither reflectively nor critically and their outlook on life and nature is of a similar colorless character.

The tribute of a smile cannot be withheld from the example of the college girl who, asked to write a description of a sunset, applied at once to the college librarian for a book on sunsets. This is a typical instance of a bad habit and the poor girl is an object of pity, not of laughter. In all probability her original equipment of observing power, and of inclination was quite normal but she had been trained unwisely and too well in the use of books of reference and could now only go on crutches.

Apart from largely influencing professional usefulness, intellectual acuteness and power of expression, the winning of a real companionship with the great books has a special personal value. For the smaller the orbit in which we are compelled to move, and the more contracted the scale of our daily relations, the more valuable, the more needful and the more accessible are those friendships of history which, if not begun through self-denials in student and early professional years, to the majority of business men, are lost forever.

I will not dwell much further upon the crying need for a more efficient mental life, its immense social value and the problems awaiting its advent. I wish chiefly to illustrate and analyze for a little the astonishing results of its pursuit, even under difficulties, on the character and the will and the great personal privileges accruing.

Its Pursuit Under Difficulties

Tolstoy sometimes wrapped his intellectual conclusions in a cloud of dreary and impracticable mysticism, but he scattered many jewels by the wayside. Here is a free translation from the Russian of one of them:

> In three ways we learn wisdom: by thinking—the noblest way; by imitation—the easiest way; and by experience—the most difficult way.

Thinking, imitation, experience; the triple discipline of everyone who wins success in living; thinking, imitation, experience, these three; but the greatest of these is thinking.

But "What," you ask, "is the standard of efficiency?" What is the measure of success? Let me ask you: Who gets more out of existence;

the man who toils the livelong day and who is too tired at night, as he pleads, to do anything but sit silent and unoccupied, or to witness the most frivolous amusements; he, or the man who has early taken pains to provide himself with intellectual resources? I have no quarrel with the lighter moods of life which we all need and enjoy, but I plead for the cultivation of an adequate sense of proportion in life and in the use of leisure.

A former lord mayor of London, who visited the United States several years ago, was a twentieth-century Dick Whittington. If you acquaint yourself with his business career you will find that ever since he was a very small boy he had been kept hard at work at tasks of an uninspiring character, and had risen through sheer doggedness and application. This seemingly overworked business man, with none of your advantages in his youth, has cultivated a natural interest in letters and the fine arts to such an extent that he has become the author of two interesting books and a valued member of several exclusive literary clubs.

Again, there is a certain merchant, manufacturer and banker in our own country who has worked as hard under difficulties as the former example and who has prospered accordingly, yet he found time to learn several languages besides his own, has compiled a polyglot handbook and become an accomplished musician.

Now these two business men are typical of many others, and either of them might, with greater show of reason perhaps than any of us, have begged off from all such side interests. But they did not elect to do so, and both of them are happier and more useful and esteemed citizens of the world than they would have been had life consisted for them of little else than the pursuit of the mighty pound or dollar and been lived only in the by-ways that lead in that direction. The fact is that it is the men who are *not* slothful in business and in the professions who get such amazing returns of interest on the investment of a little of their natural energy and scant leisure in the pursuit of self culture and in social service.

Its Nature

Consider the nature of the intellectual life to which, as we have seen, the keenest self interest calls the ambitious individual. An Elizabethan poet says:

> Absence of occupation is not rest,
> A mind quite vacant is a mind distrest.

Rest is something more than the mere ceasing from toil; it is the complete emancipation of mind and body from business care. It is not simply loafing, but loafing with an invitation to our soul, as Walt Whitman put it. Now, it is this sphere which is claimed by the intellectual life, for it is the lfe of the imagination, of the heart, of the spirit, and of the things of the spirit. It is the invisible commonwealth which outlives the storms of the ages; the state whose armaments are thoughts, whose weapons are ideas and whose trophies are the pages of the world's masterpieces, lying dusty and unopened on many library shelves. It is the realm of which a quaint old poet sang:

> My mind to me a kingdom is;
> Such perfect joy therein I find
> As far exceeds all earthly bliss.

The business man should cultivate his mind, first and foremost for enjoyment; for it is at about the age of forty that men are most prone to grow weary, to stagnate and to fall back upon their mental reserves. Yet the fate of the intellectual preparation of the school and the college for a well rounded and efficient mentality is practically decided within five years after graduation.

It is with good reason, therefore, while duly emphasizing the human factors in success, that we ask our young men to make provision for the intellectual life, for that course of living which recognizes always and without ceasing the infinite value of the mind, which gives to its cultivation and enlargement a constant and enduring devotion, and which clings to it through both the good and the evil days of professional and business life with a growing and abiding love.

The great majority of us, of course, cannot make intellectual improvement either our first or second, not to say our only aim. We must dig or delve with our hands or with our minds and must bend our backs to the burdens laid upon them. We must all have food, clothing, shelter and a little more—yet the truth remains that we cannot really live efficiently by these alone and that at the end of our day of opportunity the person who has allowed his mental and higher powers to stagnate and decay has done so, not for want of time, but for lack of inclination.

Its Use of the Imagination

The highest use to which we can put our minds is not to mere logic, that indispensable, but almost mechanical, function of drawing conclusions from facts. The human intellect is best used when it is suffered to reach out beyond its own environment, and it is this imaginative faculty that most widely separates man from the lower animals and that also divides the higher from the lower order of men.

Even in the walks of science the demonstrated truth is not the whole truth, or the best truth. It was not by instrument or calculation, but by the scientific use of the imagination that Newton took the stupendous leap from a falling apple to a falling moon. It was a great astronomer (himself the most exact of men) who said, "Science only gives us *hints* of what, by a higher method, we come to know"; and Wordsworth, in his noble *Intimations of Immortality*, has revealed, in a flash, to delighted generations the climax of the efficient intellectual life, of those intuitions which lead us to "believing where we cannot prove":

> Hence, in a season of calm weather,
> Though inland far we be,
> Our souls have sight of that immortal sea which brought us hither;
> Can, in a moment, travel thither,
> And see the children sport upon its shore
> And hear its mighty waters rolling evermore.

It is the true office of the efficient intellectual life, then, of a man's deliberate reaching out for culture, to stimulate the higher faculties of the mind; to give it something of that perfection which is found in finely tuned instruments that need only to be touched to give back noble and responsive melody. It will not only provide keenly enjoyed mental recreation, but it will store up in your imagination visions on the strength of which you can go for many days.

Its Influence on Conduct

For the man who early pays attention to the feeding and developing of his mind out of the earnest pursuit of the intellectual life there will spring the all-round man, that scarce commodity in the executive field. By this I do not mean the superficial smatterer who knows something about everything and much about nothing.

Then there will appear the conviction that there is no good time coming intellectually for any one of us. It is here already, if it is to be had at all. It also will develop the man who looks upon it as his choice possession, who makes provision for feeding his mind in his daily program and who will brook no neglect of it or the setting up of rival claims for this little corner of his life.

Again, the same pursuer of the intellectual life will not sacrifice to the service of a single dominating interest, even a mental interest, his breadth of outlook, the zest and range of his intellectual curiosity, his eagerness to know and assimilate the best that has ever been and is being thought, written and said about all the things which have enriched our human life.

Another advantage gained from this life of culture is the avoidance of the dogmatic temper. Dogmas are not confined to religion, science and philosophy; even business abounds with them. Intellectually to assent to a dogma is one thing, but to carry on the operations of the mind in a dogmatic spirit is quite another. It was the great philosopher Lessing who declared that if the Almighty offered him the choice between the knowledge of all truth and the impulse to seek the truth, he would reverently choose the second as the greater boon.

Its Effect on Character

These, then, are the fruits of the intellectual life; fruits which aid the professional man to success and develop winning and helpful personality: To be open minded; to struggle against preconceptions of ideas and people; to hold such in due subjection and to be ready to correct imperfect estimates of things and of character; to keep the avenues of the mind free and unblocked; to take pains that the scales of judgment shall always be even and fair; to welcome every new truth when it has proved its title despite any havoc it may make of old and cherished beliefs.

These, no doubt, sound like commonplace qualities well within every men's reach, but experience shows that in practice they are among the rarest. Yet joined to ability and industry, they will go a long way toward solving the problems presented by the human factors in business and society which many of us are studying. These problems call for sympathy and action based on a true understanding, and the genuine intellectual temper is not one of detachment or cold indifference, as it is sometimes misrepresented. Neither has it anything in common with that chronic paralysis of the judgment which makes jellyfish of some men, who seem habitually incapable in business and social life alike of choosing between the right and the wrong reason, or the better and the worse cause.

The intellectual life implies, on the contrary, an active, virile mentality equipped by proper discipline and exercise against the fallacies of the marketplace, the body politic and the pedant, ever animated by the will to believe and act, but always open to the air of reason and the light of truth.

Its Social Value

Yes, thinking is the noblest way to wisdom, and the secret of power is the ability to acquire, to marshal, to master ideas; to forge from them a weapon to conquer men or adverse circumstance.

Behind every method, every practice, every custom, in business and society alike, lies an idea or group of ideas—a theory—a reason. Hence, the only really practical things in life are ideas; the only practical man, the man of ideas, the man who knows. Hence, behind our individual practice lies the theory, and a full statement of the theory is the rule of the higher practice. It is thus, on the last analysis, to the man of sound theory and of efficient mentality we must ever look for better ways of doing the world's work, for progress and efficiency.

Human history is the record of the birth, the spread and the consequences of ideas. The inspiration, the stimulus to think, comes from association with living minds and from a knowledge of the thoughts of the great dead. And "Wisdom is justified of her children." For out of such mental reaction and its sympathies has sprung, in our day, an international mind, an accord in thought and spiritual things which is only becoming articulate.

Its thinkers join hands across seas and continents to accomplish a long result despite the present distress.. They work for an idealism which has no place for the triumph of aggression and no lust for the extinction of nationality or race. They know full well that the triumph of democracy —freedom from oppression, popular government and the possession of votes—has not established the essential oneness of the human race. They realize that even ethical individualism, the cult of the individual good, with its wonderful past and permanent place will not save mankind but must be merged in larger loyalties embracing the community, the nation and at last the whole world.

Its Future

The business man's instincts have begun to respond to the intellectual stimulus of the scientific method now establishing itself in industry and commerce.

His mental horizon is enlarging and his mind requires a greater range of reading and of ideas that he may ably play his part in the social fabric. Everything depends upon his willingness to strive for proportion in the use of his leisure and to plan accordingly.

There is also a growing company of men and women, outside the learned professions, who earnestly believe in the saving and leavening power of the intellectual life on our western civilization, on its institutions and upon the welfare of its individual citizens. With its pursuit and development the fortunes of our science, our arts, our literature, our government and world influence are indissolubly linked and we look for leaders to the schools and colleges where the young are taught to reflect and to all men who seek truth and pursue it.

But, for a world worth living in, we must all be touched to fine issues and the centers and shrines of the most potent influences the world has ever felt are not its seats of commerce and its capitols. From the shores of Galilee, the banks of Avon and the leafy lanes of Concord there still issue greater forces than proceed from our largest modern cities.

We live in deeds, not years; in thoughts, not breaths;
In feelings, not in figures on a dial. We should count time by heart-throbs.
He most lives who thinks most, feels the noblest, acts the best.

EFFICIENCY SOCIETY (Inc.) PSB-4

Routing--Schedule and Dispatch (Babcock)

10-15-14

A paper presented before the Second Annual Fall Convention of the Efficiency Society, Inc., at Lake Placid, New York, September 17-20, 1914, by George DeA. Babcock, Production Manager H. H. Franklin Manufacturing Company, Syracuse, N. Y.:

INTRODUCTION.

To clearly understand a practical discussion of the above subjects, it is important that we first locate their position in the scheme of industrial control. To this end it seems advisable to establish fundamental rules before we enter into a detailed discussion of any particular plan. Such rules will be presented under the following headings:

1. **System.**—Under which is discussed the relation of system to business.
2. **Classes of Productive Effort.**—Under which seven fundamental classes of manufacturing effort are shown.
3. **Analysis of Cost.**—In which the relation of direct and indirect labor to planning is discussed.
4. **Routing, Schedule and Dispatch.**—The relation of these subjects to classes of manufacturing effort.
5. **One Practical Application of the Rules.**—An analysis of the control plan as developed to supervise the manufacture of the Franklin Automobile.

SYSTEM.

System may be defined in three ways, as follows:

1. System is an order of arrangement planned to harmonize the elements of a complete thing in relation to each other and to the complete thing.
2. System is a general order from a manager which extends over a long period of time and controls the order of movement of the elements of a business in relation to each other and to the whole.
3. System is a method of fixed control for such things as are relatively constant, or which recur at uniform intervals.

The greater the number of elements in a system the more difficult it is to systematize them, but the value of the system increases in proportion to the number.

If system is a law for the relation of elements the elements must be made to obey the law.

The amount of system which is evident in operation is usually proportional to the deviation of the elements from control.

If some elements in a business are under satisfactory control without system, it may be best to bring them under systematic control in favor of those already so guided. Without this they are variables; with it they are constants.

System is not demanded by a business, if it is impossible to bring the elements of the business into a simpler and more efficient plan of control.

System is most useful in a business to control the uniform things and free the time of important persons to supervise variable things.

No set of irregular operations can be made regular by system. They must, if possible, first be made regular, so they can be governed by system.

Some businesses may be operated to successful efficient attainment with system or without system. The latter condition, though rare, is possible in some peculiar businesses.

Whether a business should be systematized or not depends on the particular desires of the responsible persons.

System is desirable, if by its application the cost of control and operation of a business does not increase.

Forms.

To practically carry out system it is necessary to provide for the distribution of instructions to the interested persons.

Forms are used for this purpose. They should be considered as instructions developed from the fundamental laws of system, and if those laws be changed the forms must be changed. It is convenient at times, if the change is but temporary, to instruct through the medium of memorandum or letter; but under no circumstances should any change in the use of a form be allowed unless by written instructions from the responsible person in charge. The fewer the forms that can be used to carry out the instructions, the easier will be the above problem; but they are of little value unless they convey specific information.

CLASSES OF PRODUCTIVE EFFORT.

Productive effort in industrial processes will include the following requirements as indicated by orders and work. These are arranged from the lowest to the highest order in manufacturing efficiency:

Class.

(a)—One order for one piece. The piece never to be reproduced.
(b)—One order for several pieces never to be reproduced.
(c)—Repeat orders at irregular intervals for one or a few pieces.
(d)—Repeat orders at irregular intervals for many pieces.
(e)—Repeat orders at uniform intervals for one or a few pieces.
(f)—Repeat orders at uniform intervals for many pieces.
(g)—Continuous or standing orders for the same piece.

Any industry may have one or more in combination of these classes of effort.

In any analysis of the industry this should be considered, the industry classified into the above classes and a control plan devised in such a manner as will secure the best results for each class. A general control plan will then be devised to relate the classes.

ANALYSIS OF COSTS.

Costs are generally taken as an index of manufacturing efficiency, and by comparison, measures of such efficiency.

Part costs are in general composed of labor and material plus certain indirect expenses as taxes, depreciation, assessments, etc.

Labor cost is composed of two elements—rate paid labor, and time taken.

An equation for cost may be expressed as:

$$C = (RT + M) + (nrt + nm) + A,$$

in which

$C =$ Cost.
$R =$ Rate per hour of planning labor.
$T =$ Hours of planning labor demanded.
$M =$ Materials used by planning labor.
$n =$ Number of pieces in each order.
$r =$ Rate per hour of operating labor.
$t =$ Hours per piece of operating labor.
$m =$ Value of material in the piece.
$A =$ All other expenses chargeable to the order.

This cost by the elimination of the material and the value "A" can be expressed as:

$$C_1 = TR + nrt$$
$$C_2 = nr_St_S.$$

in which the terms have the same value as in the previous equation, except that in addition

$r_S =$ rate per hour of special skilled labor.
$t_S =$ time taken per piece (n) by skilled labor.

If $C_1 = C_2$ and the number of pieces "n" remains the same, "n" or the number of pieces which will cost the same in the two cases will be

$$n = \frac{TR}{r_St_S - rt}$$

or it will equal the planning cost divided by the difference in unit labor cost. Assume as an example:

$T = 8$ Hours.
$R = 50$ cents per hour.
$r_S = 35$ cents per hour.
$r = 22$ cents per hour.
$t_S = .5$ hours.
$t = .1$ hour.

then

$$n = \frac{8 \times .5}{.35 \times .5 - .22 \times .1} = \frac{4}{.175 - .022} = 26 \text{ pieces}$$

For any more than 26 pieces, planning would be more economical than without planning. Less than this, planning would not be so economical.

The above calculations assume that in a production of 26 pieces of this particular part, if we carefully plan so that untrained labor can perform its operation on the part, in a very short time the total cost will be exactly equal to the same accomplishment on the part, but performed by a skilled workman who does his planning at his machine, and is unassisted by indirect labor.

The most difficult item to determine is the time (t_S) which will be required by the skilled workman to perform his operation on each part.

The above equations will greatly assist the chief planner to determine how his work shall be distributed.

Planning is usually applied and the cost distributed through indirect labor or overhead. This is due to the fact that the time elements of planning are very small and that no standard units for comparison are available.

Few managers have any appreciation of these units, but endeavor to suppress all moneys paid for special planning labor in favor of allowing the untrained and probably inefficient workmen to perform it. In this case I mean inefficiency with reference to planning effort only.

Two classes of effort are usually required in performing work. They are mental and manual.

The analysis of work into these two classes and its distribution to properly trained persons is the fundamental of planning management.

If any work be subdivided into its smallest elements and these elements be grouped in order of manual requirement, it will usually be found that much of the work being performed by skilled mental labor can be as well, or perhaps better performed by indirect labor; in some cases in a higher mental scale, and in other cases in a lower mental scale.

The labor supply of this country, and in fact of the world, contains a complete range from the highest to the lowest in the order of mental ability and of manual dexterity.

Since the labor cost of any work is the rate paid, times the time taken, the combination of these two fundamentals must be carefully considered in estimating from an analysis. The second factor, time, is so usually the unknown and therefore such an uncertain one that managers are inclined to distribute their classes of work on the basis of rate only. This is unsound.

The world lacks woefully the information as to unit times for standard efforts. Tremendous inefficiencies exist due to the fact that one manager after another must go to extraordinary costs in securing the same information. This does not in any sense enrich our industrial world, either through capital or labor.

SUBDIVISION—ROUTING, SCHEDULING, DESPATCHING.

ROUTING is to learn and plan for each element of each part, Form, Material, Method, Precedence, Quantity, Time and Place, as well as the relation of the elements to each other.

These subjects indicate the order of analysis of, and action on the elements of an industrial process. The elements may be of parts which have no relation to a whole, or may have a relation to a whole. Any part may contain any number of elements which may be similar or dissimilar in form or function.

Routing will decide for:—

(a)—Form, the drawing or sample.
(b)—Material, the chemical composition, physical properties, dimensions, or other specifications.
(c)—Method, the machines, tools or fixtures and way of handling.
(d)—Precedence, the order in which work upon the elements shall be performed.
(e)—Quantity, the number of pieces in the unit lot advised by the schedule section.
(f)—Time, the duration of effort on each element of each lot of parts.

(g)—Place, department or department and machines.

The duties of the Routing department will include the above determinations with other features that may be peculiar to a particular industry. In general it will specify all effort that may have a maximum influence upon these requirements. The appendix will show such duties as have been specified in this particular manufactory.

SCHEDULING is the determination of the rate, with respect to time and quantity, at which elements shall proceed. This section will translate the general orders of the management into detail orders for each element. It will perform the necessary clerical work and give such instructions as will be needed to accomplish its requirements. The appendix (Schedules Section) shows the duties of this particular organization.

DESPATCHING provides for the execution of the orders of the schedules section with methods provided by the routing section. In general this section will deliver the detailed instructions of the schedule section with respect to each element, to the staff and line of the shops.

The requirements with respect to ROUTING of the classes of productive effort as mentioned on page 2 are for

Class (a)—That a routing department compile instructions from data previously accumulated with respect to the least possible time element of the part, or

That a workman whose training and experience has been sufficient will plan at the machine for the element upon which he is operating or is to operate. Such a man must be highly skilled in manual operations, so that while performing on one element he can plan for the next. It is necessary that the man be manually skilled whether working with or without previous planning; a limited number of pieces will not allow the spoiling of one for the sake of experience.

Class (b)—The routing department will proceed as for (a) (one order for several pieces). In this case the reproduction after the first piece will require manual labor only. If the pieces are in sufficient quantity so that the operator will have a long period of manual labor it will be impossible to take advantage of his mental ability efficiently on this particular work.

The problem is how most efficiently to use the mental training of this man during the time he is operating.

Class (c)—The routing department will proceed as in (a), or may secure their data from the accomplishment of a skilled workman.

With the probability of the repetition of the order it is unwise, after the first order, to have a workman plan while accomplishing the manual labor.

Classes (d, e, and f)—The routing department will provide for this as in (c).

Class (g)—The method of routing will be as before except that exact analysis will be so applied that the time of each element of a part will be exactly the same, and also that the machines and tools will be very highly developed.

SCHEDULING FOR:

Class (a)—The scheduling will be accomplished by estimate of the schedules department based on previous knowledge of similar parts. It may be based on a promise estimated by the workman from previous experience.

Class (b)—Will be similar to (a); in addition the time taken to prepare and finish the first piece can be used as an estimate of the time in which all the pieces should be finished.

Class (c)—The schedules after the first performance will be based upon this and succeeding performances; or, as before, may be upon estimate by the workman in conjunction with previous records.

Class (d)—Similar to (c).

The scheduling of Classes (c) and (d) may be governed on a maximum-minimum basis, with orders emanating from the Finished Parts stock room. The frequency of orders depends upon the rate of depletion of stock to a standard minimum. The reduction of this stock is, however, caused by customers' orders, and the minimum may be reached at widely varying periods of time. The

quantity which is usually ordered, if the stock is maintained at the lowest possible value, is that amount which is estimated to satisfy sales while a new lot is being manufactured. In general, this plans especially for the conditions as indicated in (c) or (d); i. e., "Repeat orders at irregular intervals" where the lot sizes are constant.

There is no satisfactory way of scheduling irregular orders. It is desirable to systematize the manufacture even if it necessitates an extraordinary effort to secure a uniform demand in order to do so.

It may be economy to manufacture uniformly (in limited quantities) without regard to demand, but upon anticipation, i. e. small lots, manufactured at uniform intervals. Provision for unexpected demand would be made by extra orders at frequent intervals. With proper proportioning of regular orders such irregular orders could be reduced to a very small percentage of the total effort.

Classes (e and f)—By a type of control as mentioned in paper before the National Metal Trades Association by the writer under date of April 29th, 1914, and published in the "Iron Age" essentially in full, beginning July 4th, 1914.

Class (g)—Schedules under this plan will in general be set by the capacity of the equipment and the time of each element as determined by the routing division. This assumes the part to be manufactured continuously over the same operations. It requires the simplest type of scheduling but demands the highest type of routing. It is the most efficient type of manufacture, for by it practically all mental and manual work can be separated and still attain a large output for a given input.

ONE PRACTICAL APPLICATION OF THE RULES.

An application of these suggestions is shown in the method of planning as used by the H. H. Franklin Manufacturing Company to supervise the production of automobiles.

Considerable reference was made to this plan in the writer's paper before the National Metal Trades Association as mentioned elsewhere in this paper, but it seems advisable to go over portions of that writing and amplify them.

At the beginning of this work a study of the plan of supervision developed the fact that the manufacture consisted almost entirely of classes "c" and "d," i. e., (c) "Repeat orders at irregular intervals for one or a few pieces."

(d) "Repeat orders at irregular intervals for many pieces."

This was considered undesirable for the extensive manufacture which was being done.

It was caused by:

First—A variety of models and consequently of parts, in small quantities.

Second—A schedule of shipments for finished product which was affected by the seasons and was thus irregular.

The quantity of production was sufficient to give economical returns under good shop practice, and in fact the company was enjoying prosperity.

It being their desire, however, to reduce the sale price of the product to the lowest possible point, an entire revamping of methods was considered. Briefly the following method was pursued:

The time taken to perform each operation on the part at each machine was determined by estimate, or by actual practice. The operation times were then grouped by machines.

A study of the grouping indicated too large a variety to be able to manufacture under class "g," i. e., continuous or standing orders for the same piece. This was due to the fact that the product is high in quality and requires a great amount of careful workmanship. The initial materials are costly. The lowest possible sales price is therefore larger than that for a cheap product and the demand is necessarily considerably less.

Through a simplification of models and a change in the deliveries of the finished product to our sales organization we were able to modify the effort and bring it in to next to the highest class of manufacturing effort "f," i. e., "Repeat orders at uniform intervals for many pieces," with a small proportion of the product under the class (g) "Continuous or standing orders for the same piece."

Since, however, there was but a relatively small amount of the latter class, or of the first or irregular classes, we decided to plan our main control for the one class only, that is "f."

All irregular classes, such as tool work, machine repair, manufacture of sundry parts, plant repair, etc., are segregated in a separate shop. Class "g" or continuous production is considered and controlled as for class "f." All cases of class "e" are obviously controlled as for class "f."

I shall not discuss the control plan for irregular classes, since we have not completed this as yet in our works, and there are many excellent examples such as the Link-Belt Engineering Co., Tabor Mfg. Co., Watertown Arsenal and others that have long been in operation.

THE DETAIL PLAN.

(Reference should be made to the organization layout in the Appendix).

The Engineering Division, after consultation with the Routing Division, furnishes the Producing Division with a complete set of assembly and part drawings of a given car. The drawings contain all information required by the Producing Division that is indicated by Form, Material and Arrangement.

The general manager, sales and works manager determine on a given schedule consisting of a number of cars and types for each month for a certain period of time.

The schedules and drawings are furnished by the above on request of the Producing Division. The drawings are received by the chief schedules clerk, who records their receipt and submits them to the Routing Department. The Routing Department inspect the drawing, decide on the form of raw material to use, plan operations and prepare such other data and information as is shown by the requirements of their department.

The schedules section lays out the control board tape. From the operation sheets they erect and prepare the control board.

As soon as each part is erected a manufacturing order is written for it. The date tape on the board is used to determine dates for all events. The manufacturing order is indexed by the drawing number, followed by a lot number.. On a record sheet which is filled with the face copy of the manufacturing order the schedules section enter the total quantity of each part which is detailed from the general manager's schedule. As each manufacturing order for a part is written, the quantity of the order is deducted from the total. As scrap and losses occur, or parts are diverted for various reasons, they are added to this total, thus keeping a perpetual balance of "available to order." As one part schedule expires, another is secured to replace it.

At the time of writing the manufacturing order, so also is written the stores issue, the lot move tag which accompanies the goods, and a move ticket to move the material into the shop. When the material is moved into the shop, a set of job cards are written and are posted to the machines in the despatch racks. The route of the part over the machine is shown on the control board. The first operation tickets are posted in a compartment "At the Machine." All other operation tickets are posted in a compartment, "On the Floor in Process."

The despatch racks and planning boards have now been arranged in one office. The despatching of the individual jobs to the different machines in the factory is by pneumatic tubes, and the entire clerical organization is in one center.

All moves are posted directly to the boards and no intermediate record is used.

CONCLUSION.

It is not the desire of the writer to promulgate some fixed plan of supervision; it does not seem advisable to go extensively into detailed form, and especially is this true when the organization appendix defines the functions of the different sections.

The few illustrations which have been included are intended to provide an appreciation of physical methods. As the plan of control has been detailed in a previously mentioned writing, I shall not discuss this matter further.

It is very important that each manager should keep in mind the fact that forms are but the distribution of detailed instructions to particular persons for the solution of the managers' problems. These problems differ in practically every different industry and section of the industry. It is not wise for a manager to consider the use of detailed forms which have been planned by another manager until it has been determined that the problems to which they are to be applied are identically the same.

Above all things, form or method must not be mistaken as essential, but rather that the manager's orders, no matter what they be, are exactly carried out.

(Appendix)

PLAN OF ORGANIZATION AND MANAGEMENT.
GENERAL MANAGER.
P —SELECT PRODUCT.
C —ORGANIZE AND MAINTAIN COMPANY.
F —FINANCE.
M—MANUFACTURE.
S —SELL.
A —ACCOUNT.

(M) MANUFACTURING GROUP
(WORKS MANAGER)

ENGINEERING DIV.
    (Engineer.)
Research
    (Asst. Engineer.)
Design
    (Chief Draftsman.)
Inspection
    (Chief Inspector.)

RESEARCH
    (Asst. Engineers.)
Experiment
Mechanical Test
Chemical Test
Physical Test

DESIGN
    (Chief Draftsman.)
Specify
Draft
Check
Trace
Blue Print and Supervise
Maintain Alterations

INSPECTION
    (Chief Inspector.)
Test and Inspect Pur. Materials
"   "   "   Fin. Parts
"   "   "   Assemblies
"   "   "   Fin. Product

PRODUCING DIV.
    (Production Manager.)

PLANNING SECTION
Route and Equip. for Prod.
Schedules
Build. and Equip.
Employ
Train

EXECUTIVE SECTION
Despatch
Produce
Inspect
Store and Transport

PURCHASING DIV.
    (Purchasing Agent.)
Market
Purchase
Secure
Record
Route Patterns

ROUTE AND EQUIPMENT FOR PRODUCTION

(Master Mechanic, Draftsmen, Time Study Observers, Analysis Clerk, Stenographers)

Tool Design and Constructions.
Specify perishable tools and supplies.
Prepare tool lists.
Repair tools and store.
Select machines and alter.
Maintain belts and local power transmission.
Maintain machine time burdens.
Specify form and size of materials.
Route pattern orders and follow up test castings and lead proofs.
Prepare route sheets for parts and assemblies.
Decide parts grouping for assemblies.
Prepare assembly charts.
Prepare time study and analysis.
Prepare instructions cards.
Decide rates to set.
Plan path and stations for production of parts and assemblies.

SCHEDULES SECTION

(Production Manager, Asst. Production Manager, Manuf. Order Clerks, Progress Clerk.)

Prepare Progress Charts.
Prepare Control Board tape from general schedule.
Determine lot sizes and erect board.
Write and date manuf. orders.
Write and date job cards, stores issues, move tickets and tags.
Open and date assembly charts.
Date pattern orders.
Date tool orders.
Set maximums and minimums.
Requisition unclassified stores.

BUILDINGS AND EQUIPMENT SECTION

(Works Manager, Production Manager, Superintendent, Chief Millwright, Millwrights, Electricians, Janitors, Watchmen, Utility Men, Power Plant Engineer, Foremen)

Plan—Secure Architect, Specifications and build buildings and grounds.

Produce heat, light and power for buildings and provide fire protection and ventilation and sanitation.

Maintain fire department and equipment, and maintain hospital.

Alter and repair buildings and grounds and maintain order and cleanliness.

Design and provide all building equipment and maintain and repair, police buildings and grounds.

EMPLOYMENT SECTION

(Production Manager, Employment Clerk, Superintendent, Assistant Superintendent, Foremen)

Receive, interview and record all applicants for hourly labor.
Fill vacancies, endorse all applications for discharge.
Pass on rates.
Maintain workmen's time and earning record.
Classify workmen's qualifications.
Receive and account for tool checks when workmen leave employ.

TRAINING SECTION

(Production Manager, Superintendent and Committee, Chief Instructor and Assistant Foreman, Repairmen, Apprentices)

Interview all applicants.
Receive and present to committee all applicants.
Plan courses and rates.
Give instructions and supervise work in shops.
Carry out for factory apprentices, chauffeurs, motor car repairmen, salesmen.

DESPATCHING SECTION

(Assistant Production Manager, Chief Despatch Clerk, Tickler Clerk, Route File and Machine Rack Clerks, Mail Boy)

Open Route Sheets and post at time of each event.
Deliver move tickets, stores issues and tags to stores sect.
Receive materials from stores, check and date, stores issue and move tickets.
Deliver move tickets to transportation sect.
File job cards in triplicate in machine racks in order of schedule date.
Deliver job cards coupons to Foremen.
Date, stamp and deliver job cards to workmen in order of schedule date.
Receive job cards from workmen and date stamp.
Deliver inspectors coupons to inspectors.
Supervise attendance job card racks.
Receive and account for lates and absences.
Report idle machines or under repair to routing sect.
Carry all mail.

PRODUCING SECTION

(Production Manager, Assistant Production Manager, Superintendent, Assistant Superintendent, Foremen, Stores Chief and Clerks, Transportation Clerk and Movemen, Elevator Men, Inspectors, Workmen)

Carry out all orders received from DESPATCHING SECTION with means provided by other sections.

INSPECTING SECTION

(Production Manager, Inspectors)

Inspect the first part of each lot on each operation.
Hold up work and notify foreman and workman of any defect.
Check each part above as frequently as possible.
Receive and investigate all criticisms from engineering inspectors.
Report findings to foreman.
Check workmen's claim of good parts on bonus jobs.

STORES AND TRANSPORTATION SECTION

(Assistant Production Manager, Chief of Stores, Stock Men, Movemen, Elevator Men)

Maintain ledgers of all stores on hand.
Apportion Manufacturing orders and assembly charts to ledgers.
Requisition all materials called for by apportionments.
Receive, certify to quantity and store all materials.

Transport all materials on orders from DESPATCHING SECTION, and maintain scales, bin, truck and boxes in first-class repair.

THE CONTROL BOARD

Shows each element of route division work except rate setting.

Sets schedules for each element.

Despatches any delayed parts.

Records attainment of the Producing Division with respect to schedule and despatch.

Displays a perpetual inventory of work in process and parts in finished store.

Discussion

Robert T. Kent.—Mr. Babcock's paper puts in a new light one feature which has always been a matter of more or less dispute between the advocates and opponents of Scientific Management. This is the question as to when it will pay to plan work in advance for the skilled workers. The opponents of Scientific Management take the ground that in the great majority of cases, particularly those cases where work is not repetitive, that the time expended in, and the cost of the planning room more than overbalance the economies effected by the planning. Mr. Babcock's reduction of the matter to a mathematical formula will permit anyone to ascertain when it will be economy to plan in advance and when money will be lost by so doing.

It is dangerous, however, for a shop which has started in to plan in advance the work of its employes to operate with its work partly planned in the planning room and partly left to the initiative of the workman. One of the most important functions of the planning room is the scheduling and routing of work. Were, say, one-half of the product of a factory to be planned and the balance unplanned because the number of identical pieces was below the number indicated as economical by the formula, the factory schedule would soon be in utter confusion. The time expended and cost of planning an individual item is the least important factor in the case. The principal object to be aimed at is the smooth running of the factory and, so far as possible, uniform production.

Planned work can be counted on to pass through a certain operation at a predetermined time. This has influenced the general production of the factory in two directions: It makes certain that the part under consideration will arrive at an assembly point at the proper time for assembly into a group or completed product without delay either to itself or to other parts, the movements of all having been co-ordinated; it ensures that machines will be available at the time they are needed for regular product of the factory. Considering the latter phase of the question, it is obvious that were an operation of the work not planned, but left to the initiative and judgment of the workman, the workman might easily keep the machine occupied, which according to the schedule of the planning room, was required at that time for a job of far greater importance. Were the workman to continue in his occupancy of the machine, it would throw the schedule awry. On the other hand, were he to give place to the work scheduled for that machine, there would exist the possibility of his remaining idle until the machine was again vacant, or if he should be transferred to other work, the unplanned job might possibly be overlooked and delayed until it had caused trouble. In the writer's opinion, the only safe rule is to plan all the work or none of it. This opinion is confirmed by experience of several factories with which the writer is familiar, and which had adopted the expedient of sending simpler jobs into process without preliminary planning. In every case it was found that work in the end proved more costly than if it had been planned in advance.

One other feature of Mr. Babcock's paper which deserves special and serious consideration by manufacturers, is the statement that all irregular classes, such as tool work, machine repair, manufacture of sundry parts, etc., are segregated in a separate shop. No factory which makes a regular line of product manufactured either for stock or upon order, can afford to have its regular line of production broken into by special orders, no matter how important the customer may be. The injection of a special order into a regular manufacturing schedule, may easily work untold harm so far as keeping the regular stock product up to the minimum requirements of good commercial practice. By this, I do not mean the order for special work which comes in and which is planned in advance and takes its place in the regular production schedule of the factory. Even though it is not in accordance with the regular line, a special order makes little or no disturbance to the factory schedule, as all its variations from the regular product are known and planned for in advance. It is the "must" order which comes, having been promised by the sales department to a favored customer on a certain date, and this without the consultation with the factory that raises the disturbance. It means that the production manager must break up his schedule irrespective of the importance of lots in process, in order to release the machines needed for the execution of the special order. Such a disturbance of the regular schedule in certain lines of work may require two or three months to correct. It is difficult to estimate the dollars and cents damage thereby done. If the special work is of sufficiently great volume to form a valuable portion of the company's business, it should be, as recommended by Mr. Babcock, segregated in a separate factory. Even here it should be compelled to follow the regular routine of planning and scheduling before being put in process. As every job going through this separate factory would do so by the direct orders of the sales department, the production manager would be freed from a burden which he is to-day compelled to carry and which does not belong to him; namely, the responsibility of pushing through special order ahead of stock production, which is the regular business of the factory.

Mr. Babcock:

I am not satisfied that my equation, or mathematical statement, will permit "any one" to ascertain the relative economy. It is more in the sense of suggestion as to the component factors which enter into the problem. I can appreciate that it will take a pretty good man to estimate the time "t_S" (i. e., the time which skilled labor will require in which to do its work), but an approximation of this time can easily be considered and used to some extent.

In a careful reading of my paper it will be noticed that I do not advocate in any way the mixing of labor for which planning is done and for which planning is not done. Our main works is completely planned for, and in one of the statements in the paper on page 1 I say: "If some elements in a business are under satisfactory control without system, it may be best to bring them under systematic control in favor of those already so guided. Without this they are variable; with it they are constants."

I do wish to give a typical illustration of what I mean of unplanned work: Both our wood and metal pattern makers do their work without planning and we charge no overhead whatever to their work. We do use the mental capacity of the workmen as the planning brains for their department. All other lines of work, like tool making, sundry parts manufacture, are made in a separate shop which will be planned for as mentioned on page 6 of my paper. My thought in the presentation of this was that I could give something of constructive use for the present and not some particular dream for the future.

We have a dearth of standard time elements of industrial operations, and so great that it will be many, many years before we can have a reference of standard data for use in the variety of shops. Without doubt this will eventually come, because all of us are contributing to this, but it is not for the immediate time.

After all is said and done, we must positively account some way for the use of the mental ability of the skilled workman

operating at his task, and on the fundamental basis that we must have a skilled workman to prevent losses of variety of parts.

Mr. Kent has made one wrong assumption where he says that "If one-half of the product of the factory was planned and the other half unplanned it would be difficult to produce." I would like to say that production recurring at uniform intervals may be for one piece only and still be put under the same general plan as if there were many pieces.

It is not difficult at all to do job work and planned work at the same machine if the planned work has the right of way.

I am glad that Mr. Kent discussed the segregation of irregular work from regular manufacturing work, and I am satisfied that it is one of the biggest moves that a manufacturer can do if he is an extensive manufacturer. I am well satisfied with Mr. Kent's discussion of that phase of it. In fact, he seems to have gotten that matter very clearly.

EFFICIENCY SOCIETY, (Inc.) PSB-6

Getting The Office Work Done (Greeley)

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A paper presented before the Efficiency Society Convention at Lake Placid, September 18, 1914, by Horace Dudley Greeley, C. P. A., New York.

In every discussion of efficiency problems we find the word "science" and we frequently hear reference to the "science of office management." Now if "office management" means getting the office work done, it means essentially the doing of things, the use of certain rules to accomplish certain ends. This being so, getting the office work done is art, not science, for science, far from being an active power or a use of rules, is merely knowledge, accumulated, orderly knowledge, or as the dictionary tells us, "All the present knowledge of a subject, co-ordinated and systematically arranged as the result of critical investigation of truth for the sake of knowledge." In our problem, then, of getting the office work done, science provides the principles and knowledge which must be applied in the solution, but the solution itself becomes an art.

Science provides information and principles in the use of which we as artists may work out rules of procedure. The function of science is to save us from mistakes by marking out boundaries within which the rules of our art must fall. Limited only in this way, the rules of our art may vary as the originality of the artists and the solutions of a given problem may be numerous, any one of them sound as long as it does not run counter to the principles of the sciences limiting our art. The value of a solution depends upon the quality of the art which produced it. But let us not expect science to furnish directly the rules of procedure.

There are four sciences germane to the art of getting the office work done. They are the science of organization, which informs us about human factors and how they should be related; the science of physical equipment, which gives us standards for the housing of the human factors and the supplying of adequate office tools; the science of employee-selection, which provides tests by which we may determine eligibility; and the science of psychology, which shows us the general mental element and procedures of the human factors. The first three of these sciences have already been discussed in papers at this convention. The science of psychology, of course, could not be summarized in a paper of this length, but in connection with that science it seems that individual psychology is not so valuable in the solution of our problem as group or social psychology. The principles of social psychology are stated in the works of Professor Ross, of the University of Wisconsin, to which a general acknowledgment of indebtedness is made.

The four sciences named limit the art of solving our problem; they do not solve it for us. An exhaustive knowledge of all of them would not itself solve the problem in any office. An intermediary mind must work out a solution of each individual problem, making use of the knowledge furnished by the sciences and taking care that the solution does not overstep the boundaries drawn by any of them.

This paper considers the art of getting the office work done and presents certain rules which have proved adequate in individual solutions of the problem. Some topics are dismissed with a word, while others are discussed somewhat fully; this is because a paper of limited length can profitably discuss only the more interesting phrases of the problem. This paper does not attempt to state the principles of the four sciences named, although reference will be made to such of them as limit the rules discussed. More attention will be paid to psychology than to the other sciences because that is the one most often neglected, a neglect which most frequently prevents successful solutions. Compliance with the principles of the three other sciences being assumed, the problem, after all, is a human one. That is what gives it its great interest.

Solutions of our problem must involve first a definition of the work to be done; secondly, affirmative effort to establish certain means for doing it, and, thirdly, an attempt to overcome certain obstacles. A definition of the work to be done means a definite conception of it in the executive's mind and definite instructions to employees. The means of doing the work involve organization, equipment, employee-selection, the physical condition of employees, their education, loyalty and habits of work, capitalized experience and a day's work for a day's pay. Some of the obstacles to be overcome are distraction, errors, unnecessary expense, and non-availability of equipment.

CONCEPTION IN THE EXECUTIVE'S MIND.

Indecision on the part of the executive is a potent waste. There must in all cases be a clear conception in the executive's mind of the work to be done before he starts employees on the task of doing it.

INSTRUCTION TO EMPLOYEES.

An employee is entitled to definite instructions. If he is to exercise judgment as to what is to be done or as to the method of doing it he should be so informed, and that fact should be considered in fixing his compensation. Not only should definite instructions be given; some means should be taken to ascertain that they are understood. An oral assurance from the employee is not as satisfactory as one in writing because a person usually hesitates to go on record as understanding an order unless he feels confident that he does understand it.

Instructions of a general nature may take the form of an office manual which is re-edited periodically. If a manual is used it usually is more effective to give a copy to each employee than to keep one in the office which all may consult. Each employee should be required to sign a formal receipt for the manual certifying that he has read it and understands it.

Instructions may be given also by written orders covering general or special matters. Such orders sometimes are pasted in a book which all employees are required to sign, the book thereafter being kept in the office available to all employees. That method is not entirely satisfactory if the employees are numerous, because it is difficult to determine readily that all employees have signed. It is better to give each employee a copy of each order affecting him and to require a formal receipt from him. The receipt may conveniently be written at the bottom of the order, to be detached and returned to the executive with the employee's signature.

It is advisable to determine from time to time that orders are being obeyed. An order to which obedience is not required is much worse than no order. Formal examinations of employees on orders issued is generally impracticable, but questions relating to orders should be asked occasionally and any violations of orders observed in current work should instantly be made the subject of comment. Incidentally it is wise to comment also on the obedience of orders when that condition can be observed.

ORGANIZATION—GENERAL.

In forming an organization the functionalizing of the men at the head of it is a matter of great importance. The following organization scheme, which seems of exceptional merit, was recently suggested to the writer by Dr. Gustave Blumenthal, of Washington, D. C. There should first of all be an organizer, whose function it is to develop the business extensively and intensively. Then there should be an executive whose duty it is to see that the current work is carried on. Between those two there should be a man who may be called administrative. His work is the running of the business as a whole. He tempers the schemes of the organizer to meet the capabilities of the executive, and on the other hand he spurs on the executive to meet the hopes of the organizer. The work of the administrative is of a higher grade than that of either of the others. Our problem of getting the office work done concerns chiefly the executive.

ORGANIZATION—DELEGATION OF WORK.

No person, executive or employee, is adequately fitted for all kinds of work. Furthermore, all grades of work do not command the same rate of compensation. Hence there should at all times be such an assignment of work as both to secure good workmanship and avoid excessive cost. The necessity for regard to delegation of work is shown in the following instance: An executive who was very valuable in writing advertising matter, insisted on reading the final proof for typographical errors. He regularly passed errors which an ordinarily capable clerk would have detected, and in doing it he used twenty dollars' worth of salary in work which should have cost four. In justification of the expense he pleaded that reading the proof gave him new ideas; if so, he should by all means read it, but for that purpose only. The proof should be read also by the clerk competent to detect the errors, notwithstanding the additional cost.

ORGANIZATION—UNDERSTUDIES.

No man should be indispensable. An organization should not be seriously crippled by the retirement of any individual. There should be some other person able to perform the work of each employee, although it is not to be expected that the understudy would perform it equally well. Occasionally, however, we are surprised to find an understudy performing it better. It is said that a political boss once demanded the retirement of a chief clerk who had been continuously in charge of a department office during the incumbency of many department commissioners. The commisioner who was ordered to retire the chief clerk pleaded that the man was indispensable, but admitted that if the man died the office would be managed some way. The boss thereupon decreed that the chief clerk should be considered dead, and the position was given to another.

EQUIPMENT.

Nothing can be said here of equipment except to call attention to the principle that it should be suitable for the work to be done. That principle, like many other obvious ones, is not always applied in concrete cases.

EMPLOYEE SELECTION.

In our problem we are concerned with the final assignment of employees more often than with the selection of them at first. Scientific selection being assumed, the average employee soon reaches what has been called a mental plateau. That is to say, he reaches a point beyond which he does not seem able to develop. His work, instead of improving, continues at about the same grade. If the grade attained is satisfactory, there usually is no reason for disturbing him, but if it is not satisfactory effort should be made to assign him to another task at which he will render satisfaction. An employee should not be discharged if there is any way to render him useful because training a new employee is costly. Careful observation will sometimes reveal a physical or mental quality which renders the employee unsuited for his present task but promising for some other. For example, a boy engaged as telephone operator and general office assistant disclosed an unsuspected deafness of slight degree. That defect unfitted him for efficient work as telephone operator, but after he was transferred to the accounting department he developed into a good assistant bookkeeper. In another case a man employed as bookkeeper made an unusual number of mistakes. A serious effort to correct the fault failed. He had a pleasing personality and largely on the strength of that he was transferred to the collection department, where he succeeded.

PHYSICAL CONDITION OF EMPLOYEES.

The mind will not function properly if the body is not at ease. A stenographer was doing inferior work, despite efforts to correct it, and the excuse invariably was "headache." Investigation showed that the headaches were due to an uncomfortable chair. Upon the substitution of one with proper back support the headaches ceased and the work became satisfactory.

The mind will not function properly if the body is not allowed to function properly. A most common office annoyance is unsatisfactory work immediately after luncheon. Improper lunching is so common and proper luncheon so important that many large offices provide lunches for the employees. In an office when it might be impractical to provide lunches, good results have been obtained by giving employees written suggestions as to attractive combinations of food for luncheon and moderate priced restaurants where the food can be obtained. The difficulty, however, is not confined to employees, it frequently is encountered with executives. We find improper lunches all the way from the president's heavy meal of meats and desserts to the telephone girl's lunch of two chapters of Jane Eyre and a dish of ice cream. There should be some means of relaxation at the noon hour. Rest rooms for employees are useful, provided that they really are rest rooms. As for executives, the expedient of a big club in a Western city is suggestive. The club has a darkened rest room which contains a number of couches. A member of the club may leave a call at the office, retire to the rest room and sleep. A frank admission that a short sleep is what a sleepy man needs is a first aid to efficient work. One of the most energetic and active business men of Brooklyn who fortunately is able to go home for lunches makes a practice of taking a short sleep each noon. The private office of the executive might well provide for such relaxation when the need for it is felt.

EDUCATION OF EMPLOYEES.

The means of education of employees in the business of the office range from an organized school maintained by the employer to suggested attendance in outside evening schools teaching related subjects. Whatever the method, however, each employee should be taught the relation of his work to that of the rest of the office, perhaps by means of a graphic chart showing the organization and the routing of ordinary work. In connection with the systematic education of employees the office should have a library of related subjects which each employee should be encouraged to use. Employees should be advised to join organizations of men engaged in similar work in other offices, or in the absence of such organizations to form one of their own. The latter expedient, however, should be well planned before it is launched. To insure success there must be a definite program of work for the organization and means must be taken to prevent overforceful employees from monopolizing it. On the other hand the employer must remain sufficiently in the background to forestall an inference of paternalism.

One result of education of employees is likely to be increased loyalty. In the introduction to Royce' "Outlines of Psychology," President Butler says, "No process is known to man by which knowledge will surely be converted into sympathy and insight; but sympathy and insight, however great, are invariably made greater when knowledge is added to them." Give an employee knowledge of the relation of his work to the organization as a whole, let him understand the necessity for prompt and accurate performance of his task, and such a loyalty as he has will surely be increased.

LOYALTY.

There is a great deal of loyalty in the world and a great deal of it is misdirected. Persons frequently are loyal where there is no obligation and the result usually is an unconscious disloyalty in another direction where there is an obligation. The attitude of employees toward one another and toward the employer furnishes many illustrations of misdirected loyalty. The idea of being a spy or a "squealer" is repugnant to the normal person, but that repugnance should not cause an employee to ignore his obligation to his employer by concealing errors or worse in a fellow employee to whom he is under no obligation.

An amusing example of misdirected loyalty was provided by an employee who regularly spent half an hour condoling a discharged employee each time the latter called in his effort to secure reinstatement. Upon being questioned, the employee admitted he did not enjoy the half hour condolences, but he felt it his duty to encourage the discharged one. It was suggested to the employee that such encouragement should be furnished out of office hours and that there was a duty toward the employer to devote office time to office work.

The loyalty of the average person is to a leader, not a movement, to a concrete personality, not an abstract principle. Loyalty to individuals composing a firm may develop into loyalty to the institution, but usually it is impossible to secure loyalty to the institution first. Hence it is important for the executive to inspire loyalty to himself. Now loyalty is strictly reciprocal and genuine human sympathy is the foundation of it. Employees must understand that the executive takes a genuine sympathetic interest in them.

Needless to say in the expression of that interest the executive can never afford to be undignified.

There is a type of inefficient executive for which no accurately descriptive name has been invented. He is the man who is voluntarily helpless in minor matters. If he has occasion to do some trifling thing out of the ordinary he does not delegate it to a subordinate nor does he apply himself intelligently to doing it. He consults one or more subordinates as to the best way of doing the thing and finally does part of it himself. His conduct, if not the result of temporary mental abberation, cannot be said to result from a desire to be waited upon; if so, he would delegate the work. It seems an attempted flattery to be subordinates; he ostensibly admits that he cannot do the thing (which isn't true) and places himself on a par with the subordinates in an unctious discussion of the way to do it. He may be seeking to inspire loyalty by showing that, after all, he is not superior to the subordinates, and thus he and they should have mutual sympathy. Such conduct is not the way either to get the thing done nor to inspire loyalty.

HABITS OF WORK.

Habits are not all bad habits. Good habits may be as strong as bad ones and should be developed to the greatest extent possible. The formation of habits tends to standardize work and standardization of work is one of the greatest aids to the efficient dispatch of it. The habits of prompt and correct filing of papers, using a standard form of address in correspondence, securing for one's self such information as is needed without unnecessary interference with others, devoting similar parts of the day to similar work, arranging papers in the order in which they are to be used, all obviate the time and mental effort of decision in individual cases. Hence rules should be established standardizing all procedures which are capable of standardization and exact obedience to those rules should be required but Standardization must not be permitted to engender love of routine for the sake of routine, that would make an end out of a means.

Wise rules may seem foolish at times: in emergencies the following of a wise rule may have provided the single element of success. In a large office there was a rule that the treasurer should not sign a check which was not initialled by the bookkeeper to indicate that it had been entered in the cash record. One day an uninitialled check for a large amount was presented to him for signature. . He spoke to the bookkeeper over the telephone and was assured that the check would be recorded as soon as it was signed. He thereupon signed it and had it returned to the accounting department. In the meantime the bookkeeper was called to the president's office on another matter, the recording of the check was overlooked and a few days later an overdraft of the bank account resulted. The treasurer was the offending person most at fault. He had disobeyed a wise rule which at the time seemed foolish in view of the bookkeeper's assurance that the matter would receive his attention.

Habits of work should be developed to secure the best managerial results. Nothing which can be standardized in a way to secure the utmost utility, should be left to haphazard an occasional performance. In the use of periodical accounting statements the routing of them may be highly important. They should pass in regular channel through the hands of executives who need the information contained in them, and each executive should initial the statements to place himself on record as having secured the information. In one instance a business permitted large discounts to certain customers. There never was any consistent attempt to ascertain whether such discounts were confined to those entitled to them until the routing of a monthly accounting statement required the signature of an executive certifying that the discounts were correct.

In every group of workers there is a tendency to form a crust of custom which may become so strong that it cannot be broken from within. This is because it is normal for persons to acquire most of their intellectual habits from those with whom they associate. Many organizations seem ready to advance to more efficient methods, but they don't advance, and there is no apparent reason. Analysis will usually show that their failure to advance is due to a crust of custom. In such a situation there must be an insinuation of new ideas from without. Bagehot, in "Physics and Politics," says: "One of the greatest pains to human nature is the pain of a new idea. It is as * * * people say, so 'upsetting'; * * * you do not at once see which of your old ideas it will or will not turn out." The insinuation of new ideas should, except in emergencies, be as painless as possible, and the most painless way is by slantwse suggetion.

Slantwise suggestion is the kind used by Iago on Othello. It slides the new idea into the other mind without drawing attention to the suggester. It succeeds because it catches the other mind off guard and so does not have to overcome the natural tendency to combat a direct suggestion. In slantwise suggestion an executive has a decided advantage due to his prestige as executive because persons are most susceptible to suggestion from those clothed with prestige. This principle probably was at the root of the statement attributed to Napoleon that men are like digits, in that they get their value from their positions.

Suggestion should be reiterated, preferably in varying forms, and it becomes more powerful as it increases in volume. A person responds most readily to sugegstions which strike him at about the same time from different directions. But suggestion to have a permanent effect must make some appeal to reason. It has been said that virtues grow on an intellectual stalk and right conduct is thought-out conduct.

CAPITALIZED EXPERIENCE.

No experience is of importance unless it is capitalized. The results of it should be so observed and recorded that it may furnish a guide for future action. Habits of work should be inculcated to cause a repetition or avoidance of the experience according as it is good or bad. Thinking about an experience alone is of no value because thought that does not induce action is worthless except as mental exercise. Any experience which shows more efficient methods or better results should be utilized by the establishment of procedures to secure a repetition of it.

A DAY'S WORK FOR A DAY'S PAY.

This means of getting the work done is frequently the hardest to acquire. Employees who could not be induced to steal money are often the most serious offenders in stealing time and executives are no less indictable than employees. Moral laxity in the use of time for which one is paid probably results from the great waste of time which is one's own. No number of books on how to live on twenty-four hours a day or how to use the margin of one's time seems able to check this waste.

In the office the first requirement seems to be the establishment of a standard for each grade of employees. It is obvious that standards must differ with grades. Compensation of men who are employed to produce ideas is fixed on a time basis only as a rough approximation for convenience. An idea which occurs to such a worker while idly looking out the window or during a wakeful moment of the night may be of incalculable value. Such workers can be judged only by the general result of their work.

But employees who cannot fairly be classified as idea-producers should be held to a more rigid standard. The stenographer, the bookkeeper, the clerk, should at least keep busy during the office hours established, although no way is known to prevent day dreaming under the semblance of work. The least than can be done is to prevent the obvious wastes of times involved in extensive morning greetings, visiting among employees, personal telephone conversations, personal correspondence, tardiness in arriving, the taking of office time for putting on and taking off wraps and the like. Let it be understood that the employee is exepected to be at his post ready for work at the beginning of the day, to remain there during the day and to be there engaged in work at the time of closing. Experience shows that firm enforcement of this requirement tends to diminish the obvious wastes to which reference was made.

The example set by the executive is a factor not yet thoroughly understood. His work being of a different grade, the time which he takes for it is not an exact criterion for the employee. One large employer of office help in New York makes it a practice to be at his desk at 8 each morning, although the office hours begin at eight-thirty. That practice is of doubtful value in inspiring punctuality among employees. Some of them think it strange that a superior man should require so much time for his work. Others consider his work so different from theirs that it is not comparable. More of them, however, pay no attention to it.

Regard must be paid to the temperaments of employees. Time clocks should not be installed without careful consideration of their psychological effect. If their installation is likely to give employees the impression that they are mere cogs in the office wheel, it would prove poor economy. A compromise scheme which seems to work better than either time clocks or no recording of time is the use of a time book which each employee is required to sign upon arrival and departure, morning, noon and night. The value of such a book is increased by requiring late arrivals to sign below a line drawn across the page under the signature of the last employee who arrived on time.

If the effort to secure a day's work for a day's pay is made in a way which irritates employees or makes them contemptuous, or if it prevents the repose of a well balanced, well governed, but swiftly running machine it will fail. Irritation, is efficient only as sand in the bearings.

DISTRACTION.

The brain receives every moment an enormous overwealth of stimulation. Appeals for attention are made on every hand by innumerable agencies. For the brain to follow consistently a given line of thought, one must repel all diverting appeals for attention. It has been discovered that the higher a given function of the brain is the easier it is to repel appeals of a lower order. Hence prevention of distraction is aided by starting the brain along a high level. In the office, pride in the completion of one's task serves to prevent wasteful lapses. So also a mischievous office boy or a sentimental clerk may be redeemed by assigning him a task which interests sufficiently to start his brain along a level higher than mischief making or sentimentality.

It is obvious that the reduction of distracting influences makes victory over them easier by the mere reduction of their number. Employees should not face windows where prospects invite attention nor should they be placed so that other persons have occasion to pass near them. They should not be subjected unnecessarily to noises, whether of street or of office origin. Efficiency in the bookkeeping department of a large office was recently increased by moving the department to an end of the office where no one had occasion to pass.

ERRORS.

The prevention of errors in an office usually resolves itself into the problem of detection of errors. Every person makes mistakes, but few persons are so constituted that they automatically recognize their own mistakes. The doing of an act makes it relatively easy to repeat the act, but the ease of repetition decreases with lapse of time. Hence if it be necessary for an employee to examine his own work, as long a period of time as practicable should elapse between the doing of the work and the examination of it. Otherwise, he will be likely to repeat the mistake by not recognizing it. A bookkeeper with a "difference" can locate it more readily if he postpones the hunt for it until other mental activities have led him off of the brain path created in making the error.

Whenever practicable the work of employees should be reviewed by other employees in order to secure detection of errors. Where office procedures are complex it is easy to construct a system of internal check whereby a mistake by one employee will automatically be brought to the attention of another by making it difficult or impossible for the latter to perform his task. In some cases it is possible to assign employees solely to the task of examining work of other employees. For example, where much typewriting of an intricate character is done it usually is economical to have employees whose sole duty is to examine the typewritten work. In that case effort should be made to prevent the typewriters from concealing mistakes by corrections of such as they themselves discover. The procedure for the correction of errors should be formal. Where manifold work is being done no mistake should be corrected in the first instance by the typewriter who made it because it would not then attract the attention of the employees who are responsible for its correction and they would not examine each carbon to see that the correction had been made on all copies. Failure to observe this rule results sooner or later in sending out a carbon copy on which a mistake had not been corrected and placing responsibility for it unjustly on the examining employees. Incidentally a record of mistakes discovered by the examiners can form part of an efficiency record of the typewriters and the cost of corrections can be separated from the cost of original typewriting. The latter information is valuable where an hourly charge for typewriting is made and where it would be inequitable to charge for corrections.

UNNECESSARY EXPENSE.

Once an expense has been properly classified as unnecessary it must be stopped, but fine discrimination is required to determine what expense is unnecessary. Such discrimination can be exercised only by a person with an appreciation of relative values and with a position high enough to enable him to see the whole of the organization. Many small offices incur unnecessary expenses in the use of costly equipment such as pencil sharpeners, mail opening devices, and sealing and stamping machines. Such equipment would be economically sound only in large offices. Much unnecessary expense occurs also in the use of stationery, particularly that which does not leave the office.

NON-AVAILABILITY OF EQUIPMENT.

Loss of time is usually the chief element of cost where equipment is not available, but the cost may include inferior workmanship and avoidable errors. Non-availability of equipment most frequently results from lack of physical control of it through improper storage or impairment of it through lack of proper maintenance. Stationery, for example, should be so kept that particular forms can be found without search and typewriters, for instance, should be properly inspected and repaired.

There are instances where an overdeveloped sense of pride in the care of equipment militates against the efficient use of it for the benefit of the organization as a whole. In a typewriter department of half a dozen employees each operative was given a particular machine. It soon developed that no operative was willing to permit any other operative to use his machine for fear that the machine would not be properly treated, and much irritation resulted whenever it became necessary to shift machines. An analogous case was furnished on a Western railroad where it was discovered that engineers became so attached to particular engines that they would not drive them as hard as sometimes was necessary. The company thereupon required a rotation of engine for each engineer.

One cause of inaccessibility of equipment is the locked desk of the employee. Employees should be instructed to keep no property of a personal nature in the office desks and should be made to feel that every desk may be occupied by various employees and may be opened at any time by an executive. In emergencies requiring unexpected night or holiday work the locked desk of the employee becomes particularly offensive.

CONCLUSION.

It is the belief of many persons that the way to get the office work done is to do it. In emergencies they "jam it through." That method is fairly satisfactory for an occasion, but it is costly in the extreme. No machine, office or other, can stand the strain of frequent, unexpected racing. For the smooth running of any machine, office or other, there must be observance of rules which do not transgress the laws of the sciences limiting them.

EFFICIENCY SOCIETY Inc.

PSB-7

Budget Making (Hazard)

11-23-14

A paper presented before the Efficiency Society Convention at Lake Placid Club September 17-20, 1914, by F. R. Hazard, President Solvay Process Co., Syracuse, N. Y.

In attempting to prepare a Budget for any manufacturing business it is necessary to estimate first of all the quantities of finished product which can probably be sold, since it is evidently not wise to manufacture largely in excess of probable demand, and certainly foolish to fall short of stock with which to meet inquiries. To begin a budget system for a going business which has never had one, it is to be assumed that certain statistics can be made available. On examining the volume of sales for say five annual periods it is easy to determine the rate of increase shown, and for budget purposes it is fair to assume that an average rate so found will be maintained in the future, barring unforseen commercial and industrial complications. While the individual records of any business thus form a fairly safe guide for its future conduct, a broader view of the entire industry is required, especially in those lines where the national or world consumption is rapidly increasing and in those industries which require a considerable time to prepare new plant for increased production. In an industry which shows for a term of say five years an average annual increase in the national consumption of 10% it is necessary for each maker to increase his product in each year by 10% over the previous year if he would hold his proportion of the entire trade. Such increase means that in seven years each maker must double his output.

Accurate information regarding the total consumption of the country is sadly lacking in many of the important general lines. Individual makers too often have a mistaken idea that it would injure them if their quantities delivered were known to their competitors. If, however, such information were freely and accurately exchanged each maker would soon be in position to carefully and closely plan his expansion so as to surely take care of the increasing demands of his customers and obtain his full share of all new business. Each maker would thus avoid unnecessary or premature expenditure for plant which must remain idle for an indefinite time, and each would feel free from the fear that he would fail to supply his trade.

In any industry the producer has, by the simple fact of his production, entered into a contract with the public to supply his goods, and to keep on supplying them to the full extent of the public demand. It becomes his duty to prepare for the future and to be ready at the proper time to meet that demand. If each producer does his part there will be no shortage nor any surplus with the evils attendant on each. Since the present state of legislation makes it difficult, if not impossible, for the producers of any given article to freely exchange information, it would seem that the Federal authorities could furnish, by means of suitable reports, the combined total production or consumption in an increasing number of industries. These reports made under government authority would in a very short time prove of inestimable value as an aid to that regularity of production which automatically leads to efficiency.

Having now determined as closely as possible the quantity of product to be sold and therefore the quantity to be made, which should normally be somewhat greater, we take up the expected selling price. If any large percentage is already under contract at known prices it is approximately fair to assume that the remainder will be sold at or reasonably near the general average price of the quantity already placed. The recorded experience of the past few years will give a very close idea of the selling price which it is possible to obtain. Aside from the income from sales of product other items are to be taken into account, such as income from investments, in stocks and bonds of other concerns, rentals and sundry income. Summarizing the Income side of the Budget, we then have

Sales of Product, quantity, average price, amount,
Income from Investments,
Sundry Income.

The Expenditure side of the Budget includes the

Manufacturing Cost of Product,
General overhead charges,
Selling expense.

Under Manufacturing Cost we may make as many subdivisions as desired. Generally the following will be found sufficient:

				Consumption per Unit	
	Quantity	*Price*	*Amount*	*Quantity*	*Amount*
Raw Materials A.					
B.					
C.					
Labor					
Repairs					
General Expense					
Sundry Items					

A simple and useful method of dealing with raw materials is to have a Store account for each. To this account are charged all purchases and all expenses of transportation, handling, unloading, etc., up to the point where the raw material is actually ready for consumption. Thus for example, take coal. The Coal Store account is charged with the purchases of coal from A., B., C., and other dealers, the transportation charges on it, the shifting costs, the unloading expense into stock pile, the recovery from stock and delivery to boiler house. The sum total of all these items is the cost of coal at the place of consumption. The labor of coal heaver or fireman is a part of manufacturing cost. The general Coal Store account then is credited with the quantities, at the cost as above determined, delivered to manufacturing departments. The balance remaining in Coal Store account must be verified at intervals to insure against undue gain or loss, the object being to surely cover entire cost but to avoid making a profit on any of the raw materials store accounts.

Labor employed in manufacture is the only cost item which, under the best conditions, can be purchased from month to month in exactly the right quantity for the production actually made. In practically all the other items there will be from time to time excessive expenditures which will be compensated by deficient outgo at some other time. The Store accounts act as a reservoir to receive measured additions and to deliver measured quantities.

In dealing with repairs the same general principle is used in somewhat modified form. The device of a Suspense Account is found very useful. All current repairs, both labor and material, are charged each month to the cost of production, but in the case of replacement of machinery or apparatus which has had a long life it is evidently unfair to a given month to charge the entire cost of the new work in one lump. Such a course would inevitably lead to great fluctuations in the Repairs item from month to month, and thus greatly interfere with the comparative value of the cost figures. To avoid this difficulty the Suspense account receives any item deemed of sufficient importance, and each month distributes a properly calculated part to Repairs account. Extraordinary repairs, Replacements and Obsoletion can also be handled in the same manner if desired.

The cost of production may be arbitrarily increased each month by an item to be determined by past experience intended to create a reserve to meet these requirements. Since, however, these are not actual present cash expenditures, it is generally better to omit them from the manufacturing cost statement and to make suitable provision for them either by special appropriation at the end of the year or by an addition to Repairs account when the case is presented. In fixing a suitable selling price it is absolutely necessary, however, to consider these items as well as all overhead charges, like interest on bonded debt or capital otherwise borrowed or dividend on preferred stock, for it is evident that these are as much a part of total cost, as distinguished from bare manufacturing cost, as an expenditure for raw material or labor. No business can expect to thrive which does not carefully cover these fixed items and leave a suitable margin for stockholders. General Expense is too often used as a catchall for items of all kinds, which on careful analysis could be and ought to be charged to another account in the cost sheet. The difference between productive and non-productive labor must be constantly borne in mind. Here, too, the plan of distributing items from month to month is useful. For example, taxes and insurance frequently are payable in the same month. To charge the product of that month with the entire amount would vitiate all future comparisons. Accordingly, a General Expense Suspense account receives these and other items, and each month thereafter charges current General Expense with the suitable fraction, so that the entire item is exhausted by the end of the proper number of months. The method of suspended accounts has many advantages, but it must be followed with care to prevent abuse. In brief, the idea is to provide a means by which each unit of current product shall stand its proper part, and no more, of every cost item.

Selling Expense and Advertising. Each unit of product sold should be charged with its proportion of these expenses, whether current or suspended.

The Monthly Budget is intended to show the expected cash situation of the company. As it deals with the actual cash income and outgo such items as depreciation and obsoletion have no place in it. We may outline it as follows:

	Dr.	Cr.
Cash in Banks		
Petty Cash		
Proceeds of Sales due		
Proceeds of notes for money borrowed		
Proceeds of sale of Bonds		
Proceeds of sale of Stock		
Proceeds of sale of Preferred Stock		
Sundry Income		
Cost of raw materials to be bought		
general supplies		
transportation charges		
Monthly Pay roll		
Salaries		
Repayment of loans		
Interest		
Construction		
Insurance		

	Dr.	Cr.
Taxes		
Dividend on Preferred Stock		
Common Stock		
Sundry disbursements		
Selling Expenses		
Balance carried forward		

It is, of course, understood that not all the above items will be found in the budget for any one month.

The preparation of an Annual Budget involves a forward estimate of a number of items. It is, however, most useful in that it permits the manufacturer to lay his plans ahead and to make all his arrangements for raw materials, plant and labor with a fixed idea of the quantities and capacities involved. This has a tendency to regulate production and to keep both labor and plant occupied in the most orderly and uniform, therefore the most efficient manner. It is evidently more economical to produce each month about the same quantities than to run at a forced rate for one or two months and then drop below normal for a few succeeding months. Constant reference to previous budgets and comparison of present results with the former estimates will gradually produce a greater degree of accuracy in both the monthly and the annual budgets. It is possible to make these estimates correct to within two or three per cent. Under normal conditions it is generally possible to follow very closely the program proposed by the annual budget. When, however, commercial, industrial and financial conditions are disturbed and paralyzed, as at this time, by a world wide catoclysm it may be necessary to greatly modify the general plan. The existence of the budget gives a basis for change in either the upward or the downward direction. For the annual budget the two most important things to estimate are the possible production cost and the possible selling price.

Taking the actual costs attained, it is very useful to prepare an estimated cost on the theory that it is possible in each cost item to very closely approach in the future the best results attained in the past. This standard or "Bogey" sheet is constantly before the officers, who can thus stimulate any department which may show a tendency to fall below the standard. Any considerable departure should be promptly explained. The possible selling price may be closely approximated by determining what it was for the previous year and by ascertaining what it is for the quantities already under contract for the present year. Due allowance must evidently be made for existing tendencies. After only a few years' experience this estimate can be made accurate to within 2%.

Having now estimated the probable manufacturing cost and the probable net selling price free of all selling expenses, the resulting difference may be applied to the quantities proposed to be delivered, thus obtaining the gross manufacturing profit.

We can then proceed to prepare the Annual Budget as follows:

RECEIPTS:
- Cash on hand and in Bank
- Manufacturing Profits net
- Sale of Bonds
- Sale of Stock
- Loans
- Sundry Income

DISBURSEMENTS:
- Repayment of Loans
- Interest on Bonds and Loans
- Purchase of securities of other companies
- Sinking Fund payments
- Participation in Profits
- Sundries and Contingencies
- Construction of Plant
- Balance of Manufacturing Profits
- Dividends of all kinds to be paid
- Remainder of Profits

Upon examining this remainder of profits it will be easy to determine whether the figure proposed for dividends can be safely adopted, for the remainder should be ample to provide suitable amounts for

- Depreciation
- Obseletion
- Reserve Fund
- Replacements not already taken care of through construction, repairs or extraordinary repairs.

Evidently the amounts which are proper for these items must be found by experience in each industry. In general, however, it is better practice to make liberal allowance for each. The result to the stockholder may be a somewhat smaller rate of dividend accompanied, however, by the assurance of regularity and the knowledge that his investment is appreciating in both real and market value. All parts of profits thus withheld remain the property of the stockholders. They are realizable on any sale of stock.

If desired an Annual Budget may be prepared to show in a progressive manner the expected results for a series of years. This is extremely useful in an industry which shows a steady expansion and in which preparation for future increase in product requires perhaps two or more years of construction work. Such an industry must have its capacity ready when the product is required, but evidently it is only a loss of interest to complete it before the necessity arises. There is also the danger that plant prematurely erected may become obsolete by the time it is needed.

There is no particular secret or trick about Budget work. The only requisite is to marshal the facts of past experience in orderly array and use them with care and common sense as a guide to the probable course of future events. While it will not be possible to totally accomplish the estimated results, it will certainly be a source of satisfaction to closely approach them. With each succeeding effort the margin of error will be decreased.

A useful Budget depends then on statistics which have been much maligned only owing to their improper or unintelligent use. They are, in fact, excellent servants but poor masters.

A useful Budget system demands a Cost system that will present promptly the required information, an accounting system designed for the requirements of each business and so arranged as to give quickly all the essential data. Every system must have some "red tape." Just enough to bind it together is good. The moment red tape interferes with the prompt presentation of the salient facts it becomes bad. A prosperous business may be as quickly ruined by tying it up in red tape as by leaving it to a go-as-you-please progress.

The real purpose of a set of books is to present at any given moment a statement of the condition of the affairs as near as possible to the actual fact. It is granted that the books will never show the absolute truth, but so far as they depart from it they should do so in conservative directions by somewhat understating assets and overstating liabilities.

DISCUSSION

Mr. Walter S. Marder: In making up a budget for any manufacturing concern, care should be taken not to confuse items of a strictly financial nature with those of either manufacturing or selling.

There should be two secondary budgets; one covering manufacturing from the raw material up to the point where the product is ready for the market, and the other covering the packing for shipment, advertising, selling and collecting for the sales, etc. The main budget should include the financial items with a debit or credit total from each of the secondary budgets.

If the probable sales for the year can be correctly estimated the matter of budget making would be fairly simple provided, of course, that the elements of cost of the raw materials, etc. were not subject to violent fluctuations at any time. If such fluctuations are possible then the management should so arrange either the manufacturing or the financial budget as to make it possible to avail of the lowest possible prices of raw materials.

Could all the manufacturers of this or any other country estimate their probable sales within 2% or even 10% we would have reached Utopia.

There may be some factories whose output can be very closely estimated, but they are greatly in the minority.

The majority of manufacturing cannot be correctly estimated in advance for its sales are dependent upon the amount of business done by other concerns; upon local crop conditions in the various sections of the country; upon the condition of business in the various foreign countries where the output is sold.

We have several classes of manufacturing establishments:

1—Those whose product is entirely consumed and is a necessity of life

2—Those whose product is also entirely consumed but is classed rather as a luxury and not a necessity.

3—Those whose product is in the nature of plant—and its replacement is a matter of years rather than of daily or weekly occurrence.

The manufacturer of the first class may come very close in his estimate of increase of sales from year to year, because the percentage of increase will be close to the percentage of increase in population, subject, of course, to the variation in the caprices of the public.

The manufacturer of the second class is somewhat dependent upon the prosperity of the country; upon the prosperity of other business. The manufacturer of the third class is wholly dependent upon the prosperity of the country and the prosperity of other business. He must also see to it that his product is constantly kept up to date to minimize the possibility of the entire product being unsaleable on account of some better appliance coming on the market.

One statistical plan which would make the estimating for budgets easier would be the adoption of the period or 4-weekly basis instead of the monthly basis. This would give thirteen periods in a fiscal year, twelve of them each with twenty-four working days and one with either twenty-five or twenty-six working days. The only items which would have to be taken care of by journal entries would be those involving monthly payments such as rent, gas and electric bills, etc.

The advantages would be numerous—each period excepting the last would have an equal number of pay days, an equal number of Sundays— the output of each four weeks with the expenses in connection therewith could be compared with any other four weeks period.

The plan has some disadvantages, but most of them are bookkeeping disadvantages, and if the plan were universally adopted there would be but little disadvantage left.

Mr. Theodore Weicker: It is all right to provide for the demand of any article that has an established sale, and to make this provision on the figures of its sale the previous year, but when dealing with products whose demand is dependent upon the whims of the public or of the fashions, I do not think it would be wise to try and forestall the public demand of such an article.

Mr. Hazard: In a case like that, which has not escaped my attention, I would suggest utilizing the product in some other line, that is to turn it to the best advantage; in such a way as an article which has been constructed for one purpose be made available for use in another direction. The necessity for preparing for the future is greater in the case of the prime material than in the case of an article that is subject to the fluctuations or changes in ideas or fashions.

EFFICIENCY SOCIETY Inc. PSB-8

Efficient Business Corporations and Trusts (Seaman)

12-14-14

Resume of Address by Judge Alfred P. W. Seaman of New York before the Efficiency Society Convention at Lake Placid, September 19, 1914.

Judge Seaman, in his opening remarks, called attention to the fact that while we have been foremost in mechanical devices, we were not, until quite recently at least, equally alert in our business organization and administration. That the corporation is a valuable tool, the importance, proper function and place of which we have not fully appreciated. In some directions we have overworked it and in others have failed to avail ourselves of its full capacity for business development.

The name of corporation has been identified in the public mind with monopoly and business oppression; and the public, and legislatures, reflecting the public state of mind, have wholly failed to discriminate between legitimate business and manufacturing corporations, which are in fact merely extended partnerships and which should be no more subject to suspicion and special burdens than other partnerships, or individual businesses on the one hand, and on the other hand monopolies (in so far as these are objectionable) and corporations which seek and receive special public privileges which can be only extended to them on account of their corporate form and, therefore, are properly subject to especial supervision and especial burdens of license and tax.

It must be obvious to us all that under modern conditions, with improved machinery and the great quantities of almost all commodities required for the peoples of the earth, most industries must be carried on on a large scale to be profitable. The small producer has been driven out of most industries including even such simple occupation as farming. We must choose between leaving the profits of industry to the wealthy, who can command the necessary capital from their own resources, or of fostering some form of organization which will enable poor people and those of moderate means to participate in the profits of these occupations.

Pending the dawning of government socialism, the corporation is the most efficient instrument which has been devised to enable people of small means to participate in the profits of great enterprises.

There is no reason why the capital of a thousand men of small means concentered in a corporation should be hampered by restrictions or subject to taxation beyond those imposed on capital employed in a similar business by single individuals or by groups of wealthy individuals united in partnership.

Since the era of corporation baiting, which began a decade or two ago, much has been done to destroy the value of this form of organization. I wish to emphasize the importance of preserving, developing and improving this economical device and not destroying it or diminishing its value by unfair and unscientific criticism, restrictions and impositions. In these protests I am not objecting to reasonable regulations for the organization of corporations, of provisions for the protection of rights of stockholders and creditors, and of reports for the purpose of enabling the business world to ascertain the financial standing of organizations with which it is dealing and to inform the State as to the assets of corporations liable to taxation in the same manner and to the same extent as individual or partnership property is subject to taxation.

Nevertheless, it must be noted that the obligation even to furnish such reports as may seem to be reasonably required under present conditions may become a burden when such reports are required by the home State, the City, the United States and by each State in which the corporation is conducting business, and an effort might well be made to secure a standardizing of such reports so that one form may avail for all purposes. The waste of official and clerical labor involved on these lines is well worthy of study and effort toward economy.

While we comment on the number and annoyance of customs regulations encountered in passing from one small European state to another, we forget that in the United States business enterprises, if conducted under corporate form, is suject to precisely similar restrictions in securing license to do business in the various States.

A cursory examination of the statutes of various States shows how serious are the special obligations imposed on corporations as conditions of carrying on business in various portions of the country. In Alabama it is a misdemeanor for a corporation to do business without a license; penalty: a fine of $100 and imprisonment for 12 months. In Alaska foreign corporations forfeit $25 a day for each day they carry on business before filing a statement. In California foreign corporations are subject to a fine of $500 for failure to take out a license, while in Connecticut and Florida the fine is a $1,000 and in Illinois the penalty is not less than $1,000 nor more than $10,000.

How many officers of business or manufacturing corporations realize that if they do business in Colorado without a license all officers, agents and stockholders of the corporations are jointly and severally liable on all contracts made in that State?

In Arizona, as in several other States, officers of corporations, although proven innocent of any wrongful intent, are guilty of a misdemeanor and liable to penalties for discounting or receiving notes or other evidences of debt or stock of other corporations in payment of stock subscriptions, and this even if they are not present at the meetings at which this action is taken, since they are presumed to have knowledge of such action and to have concurred if they continue to be directors for six months.

A very important and legitimate object sought to be secured through the corporation is freedom from individual liability. This should be neither disallowed nor criticised; it is a legitimate method of arranging investments and should be fairly recognized and properly guarded. Not only should a man be permitted to set aside a portion of his property to be dedicated to a certain business purpose without liability upon his other interests, but it is a legitimate method which should be encouraged for outside parties to help friends or assist in furthering new enterprises to which they cannot give their personal attention and in which they cannot afford to have the interests of their general estates involved. It is also a well recognized and prudent method by which a man withdrawing from business or bequeathing interests in his business to his family may secure the continuance of such business in the hands of junior partners or others, which would be impossible if his capital were to be withdrawn. Nor should this advantage be urged as an excuse for a special tax............ ....The same freedom from liability is equally procurable through special partnerships, which are usually available only to men of wealth.

It is true that the result of the voluminous legislation affecting corporations has been that they have secured the advice of counsel to protect them in so far as possible from attacks upon their business interests, that much of the most efficient business management of the country is found today in the service of these organizations, and they have secured and hold the foremost place in the development of American industries, but it has been as a result of conditions similar to those portrayed in Kipling's story of "The Benefactors" where he shows how the progress of mankind has been, not on account of aspiration, but as the result of persecution, and that the human race has not been inspired or led to better development but has been rather "kicked upstairs."

The whole subject of corporation organization and control has been much more carefully and scientifically studied and developed in Europe than with us, and we have only of late and in few States adopted some of her suggestions.

I wish to refer to three or four modifications of corporate methods which have features of value under certain conditions, but I wish to anticipate this by saying that just as there is sometimes an ill-considered tendency to organize corporations for small enterprises which do not justify the expense and trouble, without realizing the burdens which are assumed, so it is well to guard against a tendency to try some of these new devices in business organizations where they are wholly unnecessary and inappropriate. Indeed, I believe that all proposed incorporations should be more carefully considered than has been the habit of laymen and of lawyers who have not had the time to give especial attention to this branch of law and, therefore, have not been able to fully appreciate all the results which may ensue to the embarrassment of clients.

Indeed, I know at the present time of one or two instances where business men have proposed to adopt some of the methods of which I am about to speak, attracted, so far as I can see, merely by what is to them the novelty of the method, although all these suggestions are matters of common knowledge to corporation lawyers. Corporation law has inherited less technicalities from ancient times than almost any other branch of jurisprudence, and corporate organization is a matter of practical good sense and management.

A very old device and one very widely used in England, but seldom mentioned in this country, is that of "Founders' Shares." These have been defined as shares which take profits after certain dividends are paid on other shares; a sort of preferred stock issued to the founders or promoters of the enterprise. As an illustration, in one case there were 120 Founders' Shares of 10 pounds each and 12,000 ordinary shares of an equal value. The Founders' Shares were entitled to divide among them one-half of any dividend which might remain, after paying ten per cent. on the ordinary shares.

Many ancient and well established business organizations in England are controlled in this manner. In some cases single Founders' Shares have laid the foundation of family fortunes.

Much attention has been called of late years to the misleading character of the statement of a specific par value of shares of stock. A mine is to be developed, an invention placed on the market or a parcel of land improved, divided and sold. The value of the mine or invention or the parcel of land is problematical. It may be very great, or, especially in the case of the mine or the patent, it may be trifling. If the promoters are required to place upon the property which they are conveying to the corporation an estimated value they may, even while exercising good faith and reasonably sound judgment, mislead, not only themselves, but the public. A purchaser seeing the par value of one hundred dollars stated upon his share of stock instinctively credits the corporation with this value, either in cash or property of some form, and this assumption tends to a lack of care in investigating the actual value of the property and a failure to understand what the share actually represents. While it may not be true, as has been stated, that "par value is a tool of many rascals and the honest servant of no man," nevertheless, there is sufficient truth in the suggestion to justify its quotation.

The issuance of shares representing merely proportionate parts of the assets of the corporation without suggestion of par value is no novelty in Europe, but it is only within the past two years that this has been authorized in the State of New York. This method is not, of course, applicable to moneyed corporations nor to corporations subject to the Public Service Commission nor to preferred stock, and the interests in the shares are necessarily subject to prior claims of creditors of the corporation and of preferred stockholders if there be any such.

A serious problem is presented to the officers of large manufacturing corporations which frequently require many millions of dollars of capital for their manufacturing operations but use little in their sales department on account of the requirements and restrictions of various States. It is true that most of the States limit the imposition of license fees to the amount of capital used by various corporations within the State. Even this, however, is frequently burdensome and the amount of capital so used is often difficult to determine. It is obviously impracticable for such corporations to drag the weight of the capital necessarily used in their entire business throughout the fifty States of the Union.

No objection should be taken, however, to the creation by such corporations of associated corporations with limited capital to act as their selling agents, thus practically separating their business organization into manufacturing and mercantile departments, and this course is finding favor with such corporations conducted upon economic lines.

A further and final suggestion, which may be of value in many cases and is finding increasing favor, does not refer to corporations at all, but is, indeed, a suggestion for a substitute for a corporation. This is the use of trust estates as business corporations, or what have been designated as "Voluntary associations organized or doing business under written instructions or declarations of trust." Such organizations are not founded upon any statute whatever, but purely upon contracts made between those who wish to invest their property in such form and those who are willing to accept the trust. Since, however, this has been used more largely in Massachusetts than elsewhere it has become known as the "Massachusetts Trust." This form of organization is peculiarly adapted to the handling of real estate and it is said that many millions of dollars are held by such trusts in the State of Massachusetts. So popular is this method of carrying on business becoming that these trust contracts are becoming somewhat standardized in form.

It is obvious that this method is not available where special licenses are desired from the public nor where outside funds are required, but it has the advantage of simplicity, ease of management and freedom from many of the burdensome obligations imposed upon corporations as such, especially special restrictions for carrying on business in the various States.

While the corporation seems to be regarded as an outlaw in some States, the trustees under such trusts are protected as citizens by the provisions of the United States constitution.

Some of the most generally recognized advantages of corporations are those of continued existence, exemption of stockholders from liability, transferable shares, and unity of action in litigation.

It will be readily seen that a trust may be easily created by contract which will enable the trustees and their successors to carry on ordinary business or hold and manage real estate, and which, by its terms, may, equally with the corporation, relieve the shareholders from individual liability, enable them to transfer their shares (which may be, and frequently are, represented by certificates) as freely as they could transfer stock into the corporation, and that the continuance of such an organization may be practically indefinite.

As has already been pointed out, such organizations, being founded on simple contract irrespective of any legislation, are not liable to interference by statute, are subject to no especial tax or interference by legislation, and, what is especially important, may do business throughout the land without the burden of securing licenses in the fifty States.

There are many questions which naturally occur to an experienced business man or lawyer as to the mutual relation of the trustees and parties interested and of the public and the trustees, etc. Most of these questions have been passed upon by the courts of the various States or of the United States, so that this method is no longer an experiment, but may be entered upon with confidence of securing the objects sought in a safe and recognized manner.

In spite of the many objections which have been raised the day will doubtless come when we will have a national incorporation act which will obviate many of the difficulties which have been referred to. In the meantime, and especially in view of the increased business and extended business activity which is sure to follow the present European war, it is important to all those who are interested in business enterprises and desire to carry then on in the most efficient manner, to familiarize themselves with the possibilities, both of advantage and of danger, which are involved in corporations. They will find that the possibilities of co-operative work, either through corporations or other forms, such as I have suggested, are such as to attract a large part of the progressive business enterprises of the country, and that the disadvantages, while very real, may, nevertheless, be avoided by reasonable care and attention.

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Management Thru Committees. (Carpenter)

12-23-14

An address before Efficiency Society Convention at Lake Placid Club September 17-20, 1914, by C. U. Carpenter, Pres. Fire-Proof Furniture & Construction Co., Miamisburg, Ohio.

Organization is the frame work upon which an industry hangs.

Its different parts must co-operate perfectly; each must carry its portion of the load; each must be properly placed; the strength of each member must be in proportion to its needs, and this strength must start at the bottom, and continue upward. There must be no weakness in its structure, and the component parts must knit closely into a real body. It must not only possess strength, but, at the same time, must be vibrant with life.

We cannot start better than to consider the real meaning of the word "ORGANIZATION." The definition given in the dictionary is

"The systematic union of individuals in a body, whose *officers, agents* and *members,* work for a common end."

Does not this definition, full of life and meaning, include everything? Does it not reach the uttermost part of the subject? It does not end with your list of executives, such as President—Vice-President—General Manager—Sales-Manager—Superintendent and Foreman. No! it extends down through your organization until it reaches the worker at the bench and machine, and indeed, the sweeper of your floors. Its principles are not at all included in a set of more or less pretty diagrams, which few understand and few practical hard-heads pay any attention to. No! its principles have to do with MEN! MEN! MEN!

Stop and think. Your brick walls are built, your machinery is put into place, your engine is running, all to be used by *men.* Just as these *men* operate these machines, protected by these bricks, just so will your industry lag or progress. Indeed, it can well be said that in commercial enterprises especially "The greatest study of man is man." Now, your form of organization, and the manner in which you carry out its ideals and principles, have a direct effect upon your men from President to sweeper, and thus upon the efficiency of your industry. Consider again, our definition of the word "Organization." "The systematic union of individuals in a body, whose officers, agents and members work for a common end." How far short of this condition do most concerns fall? Let us start our consideration of the ordinary organization by beginning with the workman.

One eminent authority—Fred W. Taylor—lately said, "Nineteen out of twenty workmen all over the country, feel that it is for their interest to go slow and not fast." They are firmly convinced that they are serving their best interests when they do as little work as possible for the money which they are receiving, instead of as much as possible." Any sensible Factory Manager knows that this statement is true, and that it represents a condition that is an assurance of inefficiency and loss. But, let us not stop with the workmen. Frankly, they are only doing what you and I would do, were we in their places in the usual inefficient organization.

Let us consider seriously the foremen, for they are the most important men in your shop, and are the ones who often give your industry the "black eye" with your workmen, and are the ones who are chiefly responsible for inefficient management and wasteful production. Consider a moment. Do your Executives, up in the "Front Office," sit there and imagine that you and

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your policies are the real, the vital forces in your Factories? If you do, you should rapidly undeceive yourselves. Your FOREMEN are the real forces, the real representatives of the Company to the workmen. It's *their* interpretation of your ideas and your ideals that count with the men. The men's opinion of the Company is made up of their opinion of the foreman. Two-thirds of their waking life is under his control. Their promotions—their increases in pay—their good or bad jobs—depend upon his whim, his sense of fairness. I make the suggestion that, when you return to your different factories, you look the foremen over carefully. But, if you find them inefficient, what right have you to expect them to be otherwise? Do you really give them any chance to improve themselves?

Let us first consider where these foremen come from. Taylor well says that, "Practically all men in trades have learned what they know through tradition. They have not read anything about it. They have learned what they know merely by watching other men who are around them; their foreman perhaps has taught them a little—not very much; they watch the man who is next to them; they ask a few questions of him; their neighbor makes a few suggestions. In this way they literally pick up their trade; they are not *taught* the trade." Mr. Taylor then goes on to state, indeed truly, that any Factory Manager who knows his business, knows that it is the object of every workman under him, not to give him his best work.

Your foremen were recruited from such a body of workmen, being probably promoted for superior intelligence and diligence. Still, think how far short of an ideal training he has had. This condition presents one of the chief difficulties in introducing Scientific Management in a shop, for the ordinary foreman will usually bitterly resent any outside influence coming in to improve the conditions of his department because "it will show him up," and you may rest assured that one of the chief aims of his life is to "protect his job."

Before leaving this picture, let me say, however, that these same men can be utterly changed and will become most active and valuable helpers if the right methods are used. If you watch him, help him, enthuse him, and tactfully give him his chance—you can see him grow.

THE SUPERINTENDENT.

The method of management usually adopted is that of placing all of the responsibility upon the shoulders of the superintendent and so overload him with details that the best results cannot possibly be secured. If a shop is large enough to have several assistant superintendents, the same conditions of overloading usually prevail with them. Such a system gives rise to the condition where these valuable men are so overwhelmed with comparatively petty details, that they have no time to give to the larger and important problems of effective management, cost economies, and future progress.

I claim that ORGANIZATION must be founded upon the principles of

1. Education and development of the best that there is in a man.
2. The arousing of interest and enthusiasm in the work.
3. Absolute fairness and justice.
4. Team play, or "A working together for a common end."

I consider that the ordinary one-man organization as I have seen it, with overloaded superintendent—jealous, back-biting, unimproved foremen—surly, discontented, dead-level workmen, with no vim nor spirit to them, does not fall within these principles, and is not efficient.

I claim that a properly developed "Committee System," properly carried out, will fulfill the requirements of these principles of 1. Education and development. 2. Arousing of interest and enthusiasm. 3. Fairness and Justice. 4. Team Play.

It's no sure cure, for no rigid system will fit all cases. Its main principles must be made to fit the conditions. It is no easy thing to begin and keep running. It is a *big job,* and should have the attention continuously of your biggest man. It often fails because its development is entrusted to some "Sap-head," who can talk the loudest and make the biggest show on a little knowledge. In this problem, the "show me" attitude is the proper one.

THE COMMITTEE SYSTEM.

The fundamental idea at the bottom of a committee system is the development of the "get-together spirit." The fact must be recognized, that, nine times out of ten, the joint advice of five men conversant with the subject, is immeasurably superior to any plan developed from one man's brain; that the only possible method of developing a proper shop spirit is through getting the men together; that you can eliminate their distrust and jealousy of each other only by bringing them into close contact, one with another, handling them tactfully, and showing them that "they are not such bad fellows after all." That spirit of helping one another for the good of the Company, can only be brought forth from coming together; that the desire for a concerted action on subjects vital to the Company's welfare can be cultivated in this manner, and that the men who share in this "get-together" plan, will be educated far beyond the limits ever before thought possible.

All committees should be of an advisory character. The Factory Manager or Superintendent should always be the Chairman and the deciding factor of the main committee which may be termed the General Factory Committee. The other Committees should have at their head, either the Superintendent or one of his assistants.

The General Factory Committee should be the "Court of last resort" on all important subjects, and should have the final decision on all actions taken by any subsidiary committee. The members of this General Factory Committee should be selected with great care, with a view to having the brightest, most progressive men in the shop on it. Ordinarily the personnel may consist of (in addition to the Superintendent) the Chief Engineer, or designer of the product, the head of the Tool Room, at least three foremen, and whatever Assistant Superintendents the shop may have. The head of the Cost Department may also well be a member of this Committee. Accurate notes of action taken are necessary. A capable stenographer to act as Secretary, is always valuable, for he can often straighten out many a difficulty between meetings, and the knowledge of shop conditions that he will absorb, will prove of great value.

WORK OF GENERAL FACTORY COMMITTEE.

1. Consideration of routine work, both standard and contract, and of progress upon this work. This is of great importance.

2. Consideration of possible economies and the systematic planning of cost reductions. The mere starting of a general discussion on cost reductions often opens up a surprisingly large field for this highly important work. Reports by foremen upon economies previously assigned should invariably be required, so that progress upon these very important ideas may be ensured.

3. Consideration of plans to standardize product and also new methods of design, together with reports upon actual progress made upon new ideas already introduced into the Factory. This latter is a most important subject.

for the way in which valuable ideas bravely begun can be totally buried and lost sight of in the press for the every-day output, is often discouraging.

MEETINGS.

The number of meetings to be held will depend upon the character of the business—usually two a week will suffice. There should be stated times for these meetings and nothing should be allowed to interfere with them.

SUBSIDIARY COMMITTEES.

Most Companies manufacture several different lines of product or a number of important variations upon the main product. Each line should have its own committee, formed along the lines of the General Factory Committee. Each Committee should be made up of the Foreman handling that particular line of product, and the Superintendent or one of his assistants should be Chairman. Other members of the Factory Committee should be called into these meetings, and the same stenographer should act as Secretary for both the Subsidiary Committee and the General Factory Committee. This last point is important when you consider how much information of great value to a first-class superintendent a bright man in this position will absorb.

WORK OF THESE COMMITTEES.

While the work of each of these committees is naturally restricted to the details connected with its own branch of production, still its method of procedure will be practically identical with that of the General Factory Committee, with the exception that its considerations are limited to its one branch of production. Its natural program would be;

1. Consideration of routine work in the Factory, applying to its particular line.
2. Consideration of possible cost reductions on its line.
3. Standardization of product and new designs.

By arranging so that each line of product will have its own committee, and putting on each committee the foremen who handle that particular line, it will be seen that it is possible to get each foreman on at least one committee, and sometimes two or three. Each foreman, therefore, gets the educative influence of this "get-together" plan. He feels his importance as a helpful member of a real organization, and is always spurred on by the hope that he can get on the Factory Committee if he shows proper ability and industry. In my own experience, throughout a long term of years, I have seen foremen so altered by this method of procedure, inside of a year, that you would not recognize them as the same men, so efficient had they become.

JOB BOSSES' MEETINGS.

In a large concern, it is often an excellent practice to sub-divide the workmen in a department into small groups, ranging from eight to twelve, and then to place over each group, one of the efficient workmen, selected as "Job Boss," who will continue to do his daily work at the bench and machine, but will exercise a subordinate supervision over his group. For this, he will receive a small increase in his daily pay. He will not have the right to hire or discharge men, nor will he have anything to say relative to promotions or increases of pay. Naturally, these men cannot be taken away from their work very often, without crippling the output, but short and sharp meetings with them every two weeks are advisable, for, upon these men ultimately falls the responsibility for putting through many a project successfully. Amongst these men, too, are your future foremen, and the best development of the best ones among them is of prime importance. The good effect upon the workmen of a careful selection of these bosses, based only upon efficiency, and the proper education of these men, can hardly be over-estimated. The job-bossship that they see before them daily, is their next natural step in the way of promotion, and, if they feel that efficiency will gain them consideration, the good effect will be strong and immediate. If, however, they see that these positions are filled through unfair favoritism, relationship to the foreman, or possibly the passing of money, the effect will be disastrous.

The meetings of these Job Bosses will naturally be devoted mainly to consideration of routine work and progress upon it. This applies to conditions where either stock or special contract work is being handled, or both. These meetings need be governed only by the foreman of the particular department. He will, in these meetings, develop many a "sticking point" that will help him greatly when he himself attends *his* Committee meeting. The governing of these Committees will do him much good, and the close contact with his job Bosses will benefit every one.

I call particular attention to the item on the programme for each and every Committee referring to "Consideration of routine work, both standard and contract, and of progress on same."

The bane of every Superintendent's and Manager's life is "delay, delays." The most complicated tracing systems are often needed to get any semblance of order. One trouble is that needed information as to causes and remedies is too long in coming to the one who needs it. Eighty per cent of this trouble is overcome at one stroke by Foremen's Committee Reports of progress upon every job in their department.

The Secretary of the Committee will have proper "Progress Reports" forms, showing, 1, Name of job; 2, Required Time of shipment and delivery; 3, and a number of columns representing each department in which a portion of the work will be done.

Twice a week each foreman enters the meeting, prepared to report on his department's progress on each job. He already knows when he must get it out of his Department to meet the shipping date. Each man wants to present a clean slate: Results:

1. Discovery of causes of delays.
2. Each foreman pushing work in proper sequence.
3. Each one knowing what he has ahead of him.
4. Quick action.
5. Doing away with much system.

If stock tracers are used, they should appear to take up this part of the programme.

GENERAL FOREMEN'S MEETING.

Once a month, a General Foremen's Meeting should be held, which should be attended by the Superintendent, the members of all committees, and all foremen and assistant foremen. The presence of at least one of the higher officials of the Company is advisable.

At these meetings the heads of the several committees should touch upon the important problems before their particular committee requiring solution. Progress of important work should be discussed. Each man should be required to make a statement, concerning the condition of his own department, and whether or not he is suffering any delays on account of other departments. With the knowledge that they cannot possibly "get away" with anything but the truth before their fellow-foremen and committeemen, they will, themselves, develop many an interesting situation and uncover for you many a "sticking point."

GENERAL FACTORY COMMITTEE PROGRESS OF WORK REPORT. Date, Sept.-30-13

Name of Customer	Branch Order No.	Factory Order No.	Character of Work	Date of Order	Shipping Date	Penalty if any	General Division of Work	Designing Dept.	Pattern	Foundry	Blacksmith	Planing & Milling	Drilling	Polishing & Plating	Assem.	Shipping	Remark
							Bolt										
			Spec. Vestibule				Work	7/30		8/5		8/12	8/16				
Security	N Y.		St'd. Bolt Work	July	Oct.	25.00	Pressure										
Trust	5061	3681	St'd P. S.	1/13	30/13	per day	System	7/14		8/2		8/8	8/10	8/13	8/14		
N. Y.							Vestibule	7/8	7/22	7/30	8/2	8/5	8/10				
			St'd Lining				Lining	7/13			7/26	7/30					
							Bolt										
			St'd. Vestibule				Work	7/29				8/19					
First			St'd Bolt Work	July	Nov.	30.00	Pressure										
National	5230	3721				per day	System	7/29		8/13		8/20					
Bank			St'd P. S.	21/13	20/13		Vestibule	8/3			8/19						
N. Y.			Spec. Lining				Lining	8/4	8/8	8/14	8/20	9/2					

The dates shown under headings of Departments indicate dates that work is out of one Department and into the next Date is given by each foreman. It must be correct or the other foreman will contradict him. Reports made twice a week and then sent to General Manager Committee.

You may be sure that each and every foreman will strive to his uttermost to present a clean slate before such an audience.

It is very profitable to discuss departmental records for each past month. These records can include such subjects as

1. Output; 2. Departmental Expense; 3. Reduction of Costs; 4. Suggested Improvements.

THE PART THAT THE COMMITTEE SYSTEM PLAYS IN SCIENTIFIC MANAGEMENT.

Most Factory Managers, while recognizing the value of Scientific Management, realize, too, the difficulty in the way of introducing it.

While the first difficulty appears to be the attitude of the workmen, it is not so. It is the attitude of the foremen. It is only "human nature" for them to oppose it, either openly or secretly. It is against their traditions, their training. For instance, too much of their authority is taken away by a "planning department," and the result of such work may show up inefficiency. Why not reverse the method, and, after deciding upon the essentials of your plan, let these men, whose heads are *full* of information of the real kind, help you.

If they once get the idea of scientific management into their brains, and then understand that *they* will have a chance to make a record by applying its principles in their own work, watch them go to it.

The "showing up of their own department" is forgotten in their eagerness to show what they can do, and this is especially so when this work is handled in Committees. The recalcitrant one will quickly fall into line.

Personally, I favor using the Foreman to either help or make a real "planning department." My reason is that those heads of theirs are chock full of live vital facts gained in their daily work, such as no planning department made up of clerks can ever hope to get hold of. Their sub-conscious minds are crowded with them—often altogether uncorelated—but ready for use as soon as some guiding spirit touches this mine of information with the wands of enthusiasm, self-interest, and fair and healthy rivalry.

Do this through your Committees, and prejudices are broken down, and progress begins. Things move rapidly then.

I have been asked how long it takes to have a really good, efficient committee running when it is first taken up with a number of stubborn, jealous foremen determined to resist progress. I have had most difficult cases to handle, but have gotten real progress in a month, and a good Committee, capable of running the shop in my absence, in six months.

It may interest you to know that now I know of three of our foremen who are studying the articles on Ford Auto Production appearing in The Engineering Magazine, and two others reading up on Wage Systems; all these books from our library. These men, whose life is their departmental work, will think out real practical methods of applying such principles that would never occur to you or me. They can be greatly interested in the principles of Scientific Management, if properly approached, will become helpers of great worth. By this method, the introduction of Efficiency methods is greatly facilitated.

SALES DIVISION.

The same principles of Committee Organization and Work apply to the Sales Division; indeed, with peculiar force, because, in this work, it is not a question of machinery's men methods, but it is a question of the individual who is away from your control, out on the streets most of his time.

In this Division, the Committee may be formed of

1. General Sales Committee.
2. Subsidiary Sales Committees, if the Company is large and the product varied.
3. Advertising Committee.

The General Sales Committee may be made up of chairman, General Sales Manager, his assistants; Office Manager; Advertising Manager; Secretary of Committee; the General Manager.

This Committee should consider such questions as

1. Volume of Sales needed to meet desired profit.
2. Sales Price vs. Factory Costs.
3. Orders on hand, unfilled.
4. Allowable Sales Expense.
5. How to develop new territory.
6. How to get items of new possible customers.
7. How to cover territory.
8. Salesmen's Daily Reports.
9. How to get and train salesmen.
10. How to sell standard goods.
11. How to work out orders, and the necessity for full reports on new customers, in order to properly determine credits.
12. The securing and training of agents.
13. Competition. Its nature and how to meet it.
14. Needed improvements in goods in order to meet market conditions or best competitors.

The Subsidiary Sales Committee, if any, should consider most of these same points as particularly related to their particular line.

The Advisory Committee may often be combined with the General Sales Committee.

ADVERTISING.

Its nature and extent, will depend upon the character of the product. Its scope is too wide to even attempt discussion. It is enough to say, however, that Committee Work is especially valuable here. Many mistakes and much money loss will often be avoided through a frank discussion of methods of advertising best adapted to the business, and criticisms of particular advertising purposes.

General meetings of Salesmen are of the greatest value in stimulating them, training them, and increasing their efficiency.

THE EXECUTIVE DIVISION.

Proper Committees in this Division are of great value. The higher up the line you go, the greater the responsibility, the greater the need for co-operation. The Committees here vary, of course, according to the needs of the business. Ordinarly, an

Executive Committee, and
Finance Committee, are ample.

The Executive Committee may be formed of the President, Vice-President, General Manager, and Treasurer.

In the case of large corporations with many Vice-Presidents, each one may head a Subsidiary Committee of himself as chairman with the heads of his department under him.

To this Executive Committee will come up condensed reports of the findings of the Finance Committee, the General Sales Committee, and the General Factory Committee. All of these are absolutely co-related.

The General Sales Committee reports upon the volume of present business, prices especially with relation to costs, future prospects, developments of new territory and expenses, future prospects.

THE GENERAL FACTORY COMMITTEE.

Reports upon Volume, Expenses, Costs, Improvements.

THE FINANCE COMMITTEE.

Reports upon their findings as to the relationship between orders, output, expenses. As will be seen later, it can give an accurate forecast of prospective financial conditions for months ahead. This forecast is often the guide to the Executives for actions as indicating possibly a necessary increase in Sales, or reduction in Expenses.

This Finance Committee can be made up of the Treasurer as Chairman, Auditor, General Manager, General Sales Manager, General Factory Manager.

The unusual suggestion of having the Factory and Sales Manager on the Finance Committee, is made because in the last analysis the Finances depend upon, 1st, Price, 2nd, Sales, 3rd, Output.

Many a Treasurer of a Company handling large contracts would be helped greatly by an accurate forecast of Factory Progress and Output on the big jobs. In this manner, he can count on certain results, because each man on his Committee is getting accurate statements from his Committees.

THE GENERAL MANAGER COMMITTEE.

This Committee is of great importance. It may be made up of General Manager as chairman, with General Sales Manager and Factory Manager as members, with possibly a few assistants.

Its work would consist of a review of the work of the other Committees.

The outlining of policies for the Sales and Manufacturing Divisions to follow in view of the decision of the Executive Committee.

Thus, you have a system of organization that is designed to supply that "personal touch" that is so all-important, and yet so sadly lacking in the big corporations of today.

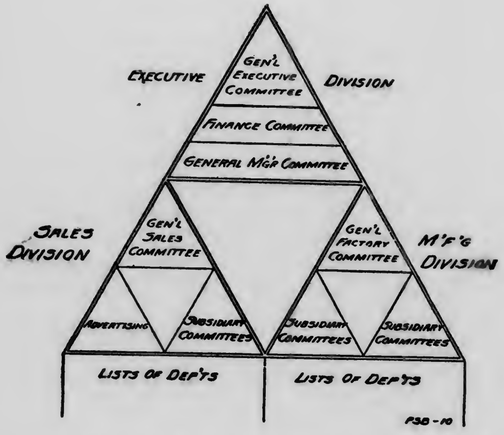
It is simple, yet most effective in arousing the interest and enthusiasm of the members of the organ to a high pitch.

It is homogeneous. There runs through it the "thread of human nature" at its best.

It will surely develop the strong men prominently, strengthen the weak, and educate all.

After all, success in any project depends upon finding "The right man," and this system will develop him and find him.

Properly developed and kept up, it will give real meaning to the phrase *"esprit de corps"* and "working for the good of the company," and will bring forth a spirit of enthusiasm, a feeling of good-fellowship, and a "determination to do the level best" that will constitute the best asset of any Company, and its greatest and strongest force towards success.



This "pyramid form" of Organization was first devised by John H. Patterson to represent the fact that the strength should run from bottom to top, and that the heads should depend upon those below.

EFFICIENCY SOCIETY, Inc. PSB-12

The Relation of the Cost Department to the Factory Organization

1-3-15

An address before Efficiency Society Convention at Lake Placid Club, September 17, 1914, by Clinton H. Scovell, A. M., C. P. A., of Clinton H. Scovell & Company, Boston, Mass.

When cost accounting is mentioned, most business men immediately think of a clerical department which is engaged in working out the cost of different articles produced, so that the management can tell at what price they can afford to sell each item. I have found in practice that other aspects of the work of a cost department, while less known, are considerably more valuable to the average business, and I am therefore very glad to have this opportunity to outline what I believe to be the most important functions of a cost department, and to show how it may be fully utilized in a modern factory.

It should be made clear at the outset that the cost department deals with cost *accounting*—with debits and credits, different in character but the same in principle as the debits and credits handled by the bookkeeper in the sales and cash records. Cost calculations are sometimes made entirely detached from the general bookkeeping, but it is very rarely that such records have anything like their full value, and their use is always attended by the very considerable risk that they cannot be proved by the showing on the financial books at the end of the year or other closing period. Only cost records which are "tied in" with the general accounting records in the treasurer's office will give complete control over the operating expenses of the factory, and enable the management to know at all times how much is invested in raw materials, work in process, and finished product; and also to know the cost of the goods which are being sold.

When I speak of a cost department, therefore, I do not refer to one engaged simply in cost *finding,* but rather in cost *accounting,* which is much broader work and much more valuable to the management.

MATERIAL COSTS

Cost accounts are so closely connected with the production in various ways, that it is the practice in many shops to initiate or authorize production by means of an order, either prepared in the cost department, or put on record there before the work is actually started. It saves time and tends toward accuracy to combine as closely as possible the operation of ordering out material for a particular job and the steps necessary to record the cost of that material. The material is not only charged to the cost of product being manufactured, but it is also credited to the stock from which it is drawn. Cost accounting, therefore, at the very beginning of production is part of the plan for controlling inventory, to make sure that the investment in stock of various kinds is kept at the economical minimum. The stock clerk at the same time is responsible for keeping the quantities of various items at the proper balance for efficiency with due regard to the factory's use of the goods in question.

The control which the cost department, working with the production department, has over the proper use of materials is most important for every industry. In one factory we found, when the cost department and production department were put in working order, that the stock of many parts was sufficient to last for more than a year, while there were none of others which were necessary to assemble the same machines. This condition is not unusual in large factories where there is no efficient cost and planning department. The result in the case cited has been a reduction of 50% in the total investment in the stock of finished parts, while the manufacturing in some departments has been considerably curtailed and shipments to customers have been made much more promptly.

In another manufacturing plant the cost records, which were "tied in" with the general books, showed an unusual consumption of raw material. Upon investigation it was discovered that a large run was spoiled and simply dumped down the sewer, without any report to the management. This waste would not have been detected if the cost accounting had not provided a careful check on the quantities used. The formula in a certain paper mill called for a small percentage of expensive pulp and a large proportion of cheap stock. The cost records proved that the quantity being used did not correspond with the formula. When this was investigated by the management, it was found that the men were not carrying out instructions, and that the company was losing many dollars a day through the kind of materials being used.

In another factory, too large a proportion of the materials was spoiled. When careful records were kept they greatly reduced the extra quantity of castings which had to be made to fill an order and allow for breakage.

LABOR COSTS

As soon as manufacturing operations are started on the material withdrawn from the storeroom, cost accounting comes immediately to have a very definite and important relation to payroll, and payroll is removed only two weeks at most from the cash drawer. Efficiency in a manufacturing plant depends more or less on the *selection* of the material for manufacturing, but the term is ordinarily used to refer to the effective *handling* of materials with the most suitable equipment, men and methods, to make a salable product. The owner or manager, therefore, faces continually the problem of the quantity and quality of product secured from the expenditure of a given payroll, in connection with the manufacturing equipment or resources at the disposal of the employees.

Some large industrial establishments will have a fairly efficient payroll department and not much of any cost system, and occasionally in a large business there will be a payroll department quite independent of the cost department, except that the operatives' records will be turned over to the cost department for entry after the payroll department has used them to calculate the amount due on the weekly payroll. This detachment is unusual, however, and rarely feasible in small or moderate sized industries. The cost and payroll departments in a factory are, therefore, usually one and the same organization, presided over by the same directing head, and the work is carried on by the same clerks who handle production records from day to day as part of the cost accounting, and then frequently give their undivided attention to the making up of the payroll at the end of the week, when the last time slips have been turned into the office.

Cost accounting in respect to labor charges consists primarily of reporting correctly the manufacturing orders on which the work has been done, or the expense or special accounts to which the payroll should be charged. In a great many industries there are numerous activities carried on in addition to manufacturing itself. One industry, for example, may require heavy expenditures for experimental work, developing the product to keep abreast of competition, or to prepare for new markets. A long established industry, on the other hand, especially one that has an extensive mechanical plant, is almost sure to expend a portion of its weekly payroll on construction and repairs of various kinds, from work on small tools to outright additions to plant, like the erection of new buildings or the manufacture of new equipment. It is essential for intelligent management that the accounting under such circumstances should carefully separate manufacturing operations from all of the accessory work carried on at the plant. Cost accounting cannot be at all accurate or satisfactory unless all such additional elements of expense are carefully separated from the current cost of manufacture, as only by so separating these elements can the production department be held strictly responsible for the results obtained from a given payroll expenditure.

COST REPORTS AND PRODUCTION

The cost department necessarily has a very intimate relation to the factory administration, for while the man in charge of manufacturing directs labor and through foremen assigns the employees to their respective tasks, it is the duty of the cost department to keep track of the expenses incurred and results secured, and report them promptly to the executive department of the organization.

In most cases it is tremendously important that the results should be reported promptly to the factory superintendent, to the foremen, and in many instances to the workmen themselves, if the efficiency of the factory is to be kept up to a satisfactory standard. The superintendent will not often concern himself with the cost of individual jobs from day to day, but where labor is handled in gangs, or where it includes all the men in a department which has a daily report of production by tonnage, or other operations on a large scale, it is of the utmost importance that the factory executives should know immediately what results are being secured, and at what cost per unit for the various kinds of products.

Some surprising results have been obtained from the use of records which give the management prompt and reliable information as to what each workman in the mill is doing. When records were introduced into one mill which had been going along at a fairly even pace, and the men realized that the management was getting information as to what each individual man was doing, the performances immediately began to improve, simply from the moral effect of having the records. Without any material change in the selling price or volume of sales the company made a greater net profit in the first two months when the cost system was running than in the previous ten months under the old plan, which did not give specific and up-to-date information. This was due to the fact that the company was selling with a very small margin of profit and any decrease in manufacturing costs materially increased the *net* profit.

In the repair department of a large plant, by keeping a record of the cost of individual jobs in comparison with standard tasks set before each job was started, a large decrease was made in the repair gang and in the unit cost of all repair work done. In this case two important factors were working together to improve the efficiency, one the task and bonus plan, and the other the prompt and reliable information as to what was going on. There is all the difference in the world between knowing today what the repair costs were yesterday or last week, and getting information of this kind that is a month or more old.

It is of great importance to have continuous current records in the manufacturing departments, not only from the standpoint of efficiency, but also to give reliable costs. Costs which are based on test runs are nearly always lower than the average, as the employees are considerably more efficient when they are under observation during tests than in their general work, when they know that no definite records are being made of their performance which will be figured out as part of the costs, and if high, will be brought to the attention of the management. Costs, therefore, which are based on test runs and not "tied in," cannot be relied upon.

COST ACCOUNTING AND SCIENTIFIC MANAGEMENT

Before leaving the subject of the relations between the cost department and the payroll, I want to point out to you how intimate the relation necessarily is between the production department and the cost department under any plan of standard tasks with bonus, which is typical of modern or scientific management. The fundamental idea in such operations is to have a consistently high rate of production, a satisfactory compensation to the workers and minimum cost to the management. It has been found by experience that plans of this sort depend on detailed calculations of standard tasks and costs from day to day, and in some cases almost from hour to hour. The planning department in a highly organized factory directs production, but the cost department must co-operate with it to measure results and to establish effective working relations between the factory organization, the cash books of the owners, and the pay envelopes of the operatives.

Under the influence of the new science of management, there has been a constant study in the last few years of manufacturing methods, operating standards, cutting speeds, etc., resulting many times in such marked increases of production that the management may be sure that an improvement has been made, even if it is not known exactly how much saving has been effected.

It has been clearly established, however, that the cheapening of manufacturing operations which is brought about by a better operating practice is frequently secured at a considerably increased cost for office force, planning departments, helpers, supervision and other indirect labor, sometimes wrongly called non-productive. The practical problem for the manufacturer is to compare the lessened direct cost for labor and equipment with the increased cost for the other factors. This he can do only when he has an adequate cost accounting practice.

The weak point in scientific management, as often practiced, is in setting up records entirely disconnected with the general books, and thus failing to measure the actual performance in comparison with the standards set in a way that will prove with the inventory. Scientific management is never complete unless there is developed at the same time an accounting practice which shall adequately reflect for the management the net results of all industrial endeavor.

BURDEN COSTS

The most elusive, or I might say "delusive," element in the cost of manufacturing is that commonly known as overhead, but more accurately described as burden. The function of cost accounting in this respect is to determine as accurately as possible the burden belonging to the various phases of manufacturing operations, or to the respective departments of a business, and then to record the burden element in the cost of the product as it passes through the various departments and adds to its value by absorbing its proportion of burden from its use of the manufacturing plant and equipment. Many cost systems which have fairly good records of material and labor fail entirely in their purpose because they deal so inadequately with the subject of burden. Important elements of indirect costs are thrown together in a "general expense" account, concealing the leaks and wastes that reduce efficiency and curtail profits.

Many manufacturers have no doubt been satisfied to handle burden in vague and general terms because they have not known of any better way to dispose of it. I will not attempt to take up in detail the methods of developing and distributing burden, but I wish to state that if the problems are approached in a scientific way and with an open mind, the overhead expenses can be first analyzed and then distributed to give burden costs as reliable as the labor and material costs.

BURDEN ON UNUSED EQUIPMENT.

Such burden rates enable the cost department to obtain reliable costs of the work done, and also make possible an accurate measure of the loss due to slack production or interrupted operation, in each department and in the factory as a whole.

When the board of directors is gathered at the end of the year, or once in six months, to learn about the results of the period under review, they do not often consider such detailed matters as the cost of individual products. On the other hand, they are always interested in any explanation which the manager has to make about losses that are due to curtailment of manufacturing operations.

The manager and the directors at such times would value more than anything else, a clear statement showing how much their company had lost on this account, especially if the details of the statement could be readily understood and proved by analysis of the operating conditions. The big problems (in regard to manufacturing) which the directors have to settle, are to make effiecient use of plant and equipment, especially if they are asked to decide on new buildings or equipment to meet a probable volume of business.

To illustrate the value of a record of equipment used in each department, let us consider a lathe department of a machine shop in which a press of work seemingly showed that more lathes were needed. By examining the records the management saw that for a long time many of them had stood idle. A little overtime work took care of the emergency, and the purchase of the additional machines was found to be unnecessary. The cost department thus makes possible scientific balancing of factory equipment which is an essential feature of efficient and economical management.

From the manager's point of view, the significant fact is that the burden is not appreciably less when the operating schedule of the plant is reduced. It is true that power charges may be slightly less, but the fixed charges for building space, interest, insurance, taxes, depreciation, and in some circumstances for repairs also, are no less when the machines are idle.

EFFECT ON SALES POLICY

If the distinction is maintained in the cost records between losses or gains on goods made and sold, and losses due to restricted output, the management will consider sales policies in a much more certain way than is possible when the facts are obscured in the haze of average costs, calculated on varying volumes of product. In respect to burden it is frequently true that costs figured as averages vary beyond all hope of comparison as the volume of output goes up or down.

When a cost accounting practice is maintained that distinguishes carefully between prime costs for materials and labor (which vary almost directly with the volume) and overhead charges of burden, the managers can see exactly in times of slack production at what price they can offer a new line to get something to carry the burden of the factory, in addition to the direct cost of labor and material. This, it must be admitted, is to some extent a matter of policy, for it may be better to hold a price and restrict output, rather than break the market by quoting prices that will give temporarily a little additional business.

Whatever the effect on sales policy, good cost accounting, including correct burden distribution, is a matter of enduring importance from the point of view of manufacturing. Changes in volume may completely obscure gains or losses in efficiency, and render comparative cost of similar product impossible from season to season, solely because of the variations in the amount of business done. Reliable costs, comparable under all conditions, are not to be secured unless the burden charged to production is only that pertaining to the equipment that is actually at work.

COST ACCOUNTING AND MANUFACTURING POLICY

The executives are also interested in scientific burden distribution when they determine large questions of policy in buying, manufacturing and selling, whether, for example, to manufacture, or to buy and assemble. There may be some work, such as box making or printing, which is in competition with outside companies, and where the true comparisons can be made only after the proper proportion of burden has been considered. The question may also arise whether to buy or sell the main product partially completed. For instance, a factory making shoe findings may buy leather in sides, blocked or cut, and may sell at any stage in the process of manufacture, depending upon the market, the condition of the factory, and the cost of the product up to any given point. A scientific distribution of burden is essential in determining the point where the greatest profit can be made.

In solving such problems the management should look to the cost department for the information on which to base their decisions. In any large concern the cost department must be the eyes and ears of the executives, as it is impossible for them to know by personal observation what is going on in all the departments at all times.

What personal observations they make are liable to lead to incorrect conclusions, without reliable information regarding the average performance of employees. For example, in a large plant where the superintendent was accustomed to make daily rounds of all the departments, it was the custom of the workmen in one of the stockrooms to have a man on guard at each door who would, on the approach of the superintendent or foreman, signal to the other employees by dropping a casting or giving a low whistle. The result was that the department had a good reputation for hustling. As a matter of fact it was exceedingly inefficient, as was proved later by a change in management and the introduction of records and a piece work system for handling the stock, which reduced the force by 15 men.

The function of the cost department is to gather information from which the management can outline its policies, and then record to what extent and how quickly these policies are being carried out. Proper reports should relieve the manager of details and at the same time so visualize conditions that his personal efforts may be applied wherever and whenever necessary. Better management, more profitable management, is not to be attained through some miraculous remedy to be applied as a fertilizer to make the business grow. It is almost solely a matter of studying the business critically and then acting intelligently upon the information secured. The information for such study will be at hand in the cost department.

Since the cost department is both the eyes and ears of the management, it is especially important that both their sight and hearing be acute. Not only should the records be well designed to fit the peculiar needs of the business, but the man in charge of the cost department should be capable, not only of keeping the records in balance and seeing that they are arithmetically correct, but able also to read the results and present *live* facts to each man interested, whether he is running a machine tool, or is a member of the board of directors. The head of the cost department should be so recognized in the organization that he may be in touch with all important matters, and thus be of the greatest assistance to the executive officers. I might almost say that it is impossible to get too good a man to have charge of the cost department.

COST ACCOUNTING IN DIFFERENT INDUSTRIES

One of the most obvious facts connected with cost accounting is the widely varying demand that different kinds of industry make on a cost accountant.

I know of one mill devoted exclusively to the manufacture of grain bags, with no change throughout the year in the size or grade. The chief variable element in the cost calculations is that of raw material, which in turn depends on the cotton market. The cost system in this mill consists solely of a subdivision of the expense accounts, following more or less closely the successive steps in manufacturing the absolutely uniform product. The chief function of a cost department under such circumstances is to record correctly the subdivision of the payroll, and to report the unit costs from week to week or month to month.

A textile mill making fancy worsteds, on the contrary, has one of the most complex cost problems. This is due to the great variety of product, frequently sold on such a narrow margin of profit that small and exact distinctions must be made between the costs of different fabrics—and labor, material and burden separately.

Tannery cost accounting is difficult chiefly because hides and partly finished leather are relatively unknown quantities, and costs can be apportioned only on the information secured when the finished leather is graded and ready to ship. In tanneries, as in many other continuous process industries, "process rates," combining labor supplies and burden, are the only practical means of getting reliable costs at a reasonable expense of clerical labor.

A machine shop, doing jobbing work, must keep an individual cost of each job. Reports must come from the shop showing the material used, the work done, and the time consumed. The cost department will accumulate the direct charges and add the burden (which includes all the indirect labor) so that they will have a reliable total cost for the completed job.

Another factory makes only suit-cases of rattan, cane and woven grass, using a little metal for fastenings and trimmings, and leather in small pieces for the corners and bindings. A few of the suit cases have iron frames and substantial straps in addition, but all of this product can be finished within such a few hours after it is started that the cost accounting consists solely of scheduling the various steps of manufacturing, taking an inventory at the beginning of a production period and another inventory at the end to check up the scheduled cost of the goods manufactured in the interval. This principle of scheduled costs is capable of wide application in such industries as the making of shoes and clothing, and sometimes can be applied successfully to manufacturing operations so minute and complex in their relation to each other that they cannot be satisfactorily or economically recorded in any other way.

Cost accounting in a piano factory is largely a question of scheduling material on master lists and keeping an exact control of production. If the labor is largely piece work, as it is in many factories, both labor and burden may be scheduled almost as conveniently as material, and the scheduled costs proved at frequent intervals by accounts controlling stores and work in process.

These examples show how the ingenuity of an experienced cost accountant is sometimes taxed, like the resources of a mechanical engineer, to find new ways to apply well-known principles so that the operations may be accurately recorded and measured.

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Cost accounting at its highest development is a science and an art worthy to rank beside some of the older and better known professions. It depends not only on mathematics and economics, but sometimes to an important extent on physics and chemistry. It deals constantly with great problems of human nature; it is one of the most interesting vocations for an energetic man; and it has a large reward for a man interested in adding to the sum total of human knowledge.

DISCUSSION

Mr. P. R. Goodwin: Mr. Scovell begins his paper as follows: "When cost accounting is mentioned, most business men immediately think of a clerical department which is engaged in working out the cost of different items of product, so that the management can tell at what price they can afford to sell each item." From sad experience many a cost accountant would say: "When cost accounting is mentioned, most business men immediately think of a bunch of clerks who are engaged in working out *different* costs for the same item of product so that the management *never* can tell at what price they can afford to sell each item."

There is absolutely no reason why the cost department should not be all Mr. Scovell has suggested, and there is every reason why it should be, but how many cost departments are there today that are what they should be? If they are not, whose fault is it? Not the cost accountant's—generally—he is laboring under a curse, the curse of the word "accounting" which production and mechanical men tell us is only a high sounding name for the old fashioned "bookkeeping." Haven't you all met the self-made man who says "All rot this bookkeeping business, why I don't know anything about bookkeeping, or as you call it now accounting, but look at me, I've made a lot of money and *say* I can hire all the bookkeepers I want for $18 a week." That's the attitude of the men who do things, who produce. Of course, *we* know that accounting produces, but it's hard to get the rest of the organization to admit it, and treat the cost department as an equal and give it the information it needs, and that it must have to produce the best results—the results described by Mr. Scovell.

You are all familiar with the newspaper phrase—"Interesting if true." That is about what might be said and *is* said of the cost records in too many plants. In many cases these records are referred to rather disrespectfully, as Ancient History. A good motto for cost departments, would be, "Accuracy and Speed."

Both accuracy and speed, however, depend not so much on the cost department as the departments that furnish the necessary information and records from which the costs are figured. In too many cases the cost department has to go after this information, they have to find out whether jobs have been finished, whether charges for time and materials are correct and whether unusual conditions have contributed to making certain costs apparently excessive.

The cost department should be informed promptly when jobs are completed—they should be able to accept without question the time and material figures and should certainly be advised when for any reason whatever a job is likely to cost an unusual amount.

Other departments in the organization should certainly be forced (the word is used advisedly) to keep the cost department posted on current affairs, and to look upon it not as a statistical bureau—not compiling data relating to the dead past, but as a Bureau of Vital Statistics, if you will.

If, however, the cost department is to be regarded as a live issue it must show signs of activity and activity of a positive and not a negative nature. About the first requisite would seem to be that the members of the cost department know something about what they are doing, that they know something about the processes of manufacture, about the various kinds of material used and the operation of the different machines in use in the plant.

There is many a clerk, today, figuring costs, who doesn't know what he is doing. He is just figuring, that's all, the figures don't mean anything to him, as Wordsworth says,

"A primrose by a river's brim,
A yellow primrose was to him
And it was nothing more."

Cost clerks ought to be educated, they ought to be taken around the factory gently, but firmly, and told "this is a milling machine, this is a lathe, this is the drilling department, this is iron—it doesn't cost as much as brass," and a few other simple but important things, which if known would prevent foolish errors on their part.

A cost accountant, or the head of a cost department, should know a whole lot about the business. He ought to *come* into the cost department from the factory—later on he will find it advisable to go *into the factory* from the cost department on a good many occasions and the oftener he goes the more interesting *and true,* his records will be.

EFFICIENCY SOCIETY, Inc. PSB-14

Co-operation Between Competitors (DICKINSON)

1-15-15

A paper presented before the Efficiency Society Convention at Lake Placid Club, September 17-20, 1914, by W. N. Dickinson, General Elevator Co., New York.

Co-operation may be classed as theoretical and practical, and much of the former has been attempted, with but little permanent result. Some of the practical co-operation has however worked out most excellently in the form of Trade Associations. The best example with which I am personally acquainted, of successful co-operation between people engaged in the same line of business, but not actual competitors, is the National Electric Light Association, which now has a membership of something like thirteen thousand and includes the various electric light companies and their employees and Associate members. This Association in so far as the Class A. members are concerned; namely the electric light companies themselves, does not properly come under the heading of this discussion, for the reason that while its members are in the same line of business, they are not competitors, save possibly in a few cases, as they furnish current under franchises in different cities. There is no doubt that to this fact, and the unique position in which they are thus placed which permits of their discussing with the utmost freedom the various methods originated or employed to benefit or increase their business, much of the success of this Associotion is due, but the opportunity for this free interchange and energetic thought and experience was recognized and intelligent and energetic advantage was taken of the procedure thus opened to benefit and increase their individual business, and efficiency consists quite as much in recognizing opportunity, as in pursuing the opportunity along economic lines. This freedom for discussion and interchange regarding intimate particulars, between men engaged in the same line of business who are actual competitors can hardly be expected, but nevertheless, much of this interchange can occur without harm to the individual, and it is quite within the scope of efficiency to determine to what extent this can occur. Owing to the course, which we are advised by the Press was pursued by some of the large corporations, in which control of apparently competing houses rested in one office through secret understandings, or control of a large percentage of stock, and a restraint of trade thus established, much suspicion has been aroused concerning any attempt by competitors in a given line of business to co-operate in any way. This suspicion is aroused not only in the eyes of the Federal Government and interested consumers, but in the eyes of Labor Organizations who fear that such co-operation may tend in some way to restrain the rights, liberties, or wages of their members. Nevertheless a considerable number of organizations have been formed; some composed entirely of houses in one line of business and others composed of houses engaged in various lines of business, but including among them many houses engaged in the same line. So long as such organizations have kept away from the Labor Question and the matter of prices has been dealt with merely from the standpoint of cost of raw material, cost and methods of production and merchandising and interchange of ideas relating to general business and convenient methods of conducting same, they have been reasonably free from restraint and much good has been accomplished through such co-operation as was possible. A few months ago the Saturday Evening Post published a series of articles in popular form, relating to some of these organizations. These articles dealt in the main with Organizations concerning themselves with trade within the boundaries of the United States, but there are also several organizations dealing with Foreign Trade which are really co-operative and whose luncheons, meetings, bulletins and correspondence are open to all who are eligible under the individual by-laws of each, be they corporations, firms, or individuals, large or small in their respective lines of business. Some of these took an active part but a few weeks ago, in pointing out most clearly that certain proposed legislation would seriously affect the efforts of American Manufacturers in foreign fields, while having no bearing upon the activities of the foreign firms, whom the Americans must meet in competition. This was co-operative effort to good effect with injury to no one.

It is not however concerning such forms of co-operation that I particularly wish to speak this morning, but of the intimate and direct co-operation between competitors in the some line of business, as it seems to me that we have here a feature which is more closely associated with the thought and purpose of this meeting and subject. It is only necessary to examine the Business Directory of the United States or of any State or of any City, to have brought home to one, the fact that of the many houses mentioned under any one business heading, a large percentage must, in the natural course of events, have an accumulation of data, patterns, tools or other equipment, common to all, but accumulated individually, at a very considerable individual expense, and actually in use during an uneconomic portion of the time. I am not speaking now of the data, patterns, tools and equipment essential to the individuality of the houses using them, but to the great mass of general data, patterns, tools and equipment used by all manufacturers in a given line of work and having no specific individuality of their own. Much of this economic waste is recognized and as a result, addressing lists for circularizing and certain basic Stock are available to whoever may wish to buy, but even these ordinary general facilities do not seem to be employed as universally as might be expected; possibly on account of a lack of knowledge of their availability, but apparently for the reason that individuals fear that the knowledge that they are not doing all of their work under their own roof might weaken their position in the eyes of their customers, or that they feel that they have so much keener insight and judgment than the majority of their fellows, that they have evolved a completely new advantageous method of procedure, when as a matter of fact, the same general method or a better one is employed by thousands of others. Bear in mind that I am not decrying individual thought or action, for initially that is the secret of the success of the American people, but that success could only have come about in abundance throught the later joining together of individual effort on an economic scale with respect to production, and that has resulted in the large corporations. That even such large corporations which might almost be viewed in the light of the favorable position occupied by the National Electric Light Association, in view of the fact that they have many departments or factories engaged in the same line of business, but are non-competitive, do not feel that they have reached finality in efficiency through co-operation, is amply attested by the presence of many of the gentlemen here to-day. For those who are not included under the heading of large corporations there is still open, to a considerable extent, the same procedure which is possible in the large corporation if they will but become better acquainted with their neighbors and relax somewhat in that feeling of secrecy and jealousy regarding knowledge of their own movements, which is a mark not of the present day, but of the day of small trade and the secret process. In older days the skilled workman in a shop would hold his preferred position through his knowledge concerning some part of the process or work and of the jealousy with which he guarded that knowledge. To-day the scientific societies, engineering societies, and schools distribute information freely at the earliest possible opportunity, and this distribution

is ably seconded by the trade press. The real theory back of this greater freedom in the dissemination of new knowledge is a certain pride and confidence which permits the individual to give freely of his knowledge, which has been gained only by a studied application, with the feeling that not only is he giving with the general good and progress in mind, but that he can afford to give freely of his knowledge, due to the fact that through the training acquired in obtaining same, he has placed himself in a superior position and that by the time those to whom he is freely giving have advanced to his present position, he will have advanced so much further, that his position is still assured. For several years I have been engaged in Foreign Trade and have traveled in many countries outside of the United States, and in a number of these the wage rate is a fraction of the wage rate in the United States, and it was necessary to meet in competition in a neutral country, the products of foreign factories in which the wage rate was much lower than in our own. In the cost of raw material there was no great difference, and such difference as did exist was in favor of the United States. The entry charges into most of the neutral countries were the same, but the transportation charges were apt to favor the foreign country. On any article in which labor constituted a large percentage of the cost, the foreign country held a tremendous advantage, and the ingenuity of the American was brought into play to devise special machinery whereby this labor percentage could be reduced. This he did with remarkable success which assisted him to hold his position for a while, but the foreign countries have copied or purchased much of this labor saving machinery with the result that in combination with the low cost of labor and persistent and methodical methods in the prosecution of their trade relations, they have gained an enormous export trade, of which at this time, we see frequent mention in the daily papers. There are certain lines of trade which have been so associated with the conception of American thought and method that they have long held their own in neutral countries at higher prices than the foreign products, but nevertheless the lower price makes for easier and volume selling and efficiency makes for the lower price, while still providing for a profit. The foreign trade field in a competitive line is good ground in which to stimulate thought with respect to lowering the cost of production and the transacting of business, and applying that training, I see no reason why competing manufacturers or others in this country cannot co-operate along entirely lawful and proper lines to a very much larger extent than they do at present and in a manner which makes for efficiency and lower cost. Every manufacturer or business house has a friendly clientelle which would prefer to buy as much as possible of the goods of a certain line from the single house, as the routine is thus simplified and the relations between the two are strengthened. In the line of most every manufacturer there is some gap which for one reason or another, he has never filled. Sooner of later a good customer inquires for an article represented by this gap and is told that the house is not in a position to supply it. The inquirer has been accustomed to have his wants in this particular line filled by the one house, and has become to some extent unfamiliar with the general trade. He is put to inconvenience by being obliged to go out and hunt up the article or articles unobtainable through the customery channel, through the existence of this gap, and the manufacturer in question loses a scale and eventually he may lose the customer. The manufacturer may decide that rather than have his customer go to others, he will specially manufacture the article in question, although from the nature of his general business, he realizes that he can expect to do so only at a loss, and is taking the action entirely as a matter of policy and not as an economical proceedure from the manufacturing standpoint. Assume another case of a contractor or dealer who sells or installs manufactured articles and gradually developes the idea that rather than purchase such articles he will manufacture them himself. If the article is small and requires but little space in which to manufacture and no unusual technical skill or design, he may possibly do this to advantage, but if the article is bulky and requires considerable space in which to manufacture and unusual technical knowledge to insure proper design, the chances of his producing a good article on a commercial basis and making a success of the venture, are not bright, unless he invests a considerable amount of money and really developes into a manufacturing house. There are doubtless hundreds who have made this attempt, and produced mediocre apparatus to the inconvenience and expense of themselves, the public, and the trade in general, and as a by product have duplicated in these same hundreds of cases standard patterns and material which are in a measure common to all classes of the type of apparatus involved. From the economic standpoint of production, how much better it would have been had the manufacturer felt free to go to the competing manufacturer, explain the situation, purchase the material called for at a trade price and sell it to his customer at a fair consumer's price, at the same time making clear his willingness to reciprociate. He would have held his customer and saved his inconvenience, and it is likely that the apparatus purchased from his competitor would be quite as good as anything he could design and manufacture on the spur of the moment. On the other hand, from the same economic standpoint, how much better it would have been for the hundred dealers or contractors, instead of individually attempting to manufacture in a small way with attendant duplication and in many cases mediocre results, coupled with inevitable distraction of their attention from the feature of the business with which they were familiar and from which their main income derived, had continued to purchase their material and devote their progressive energy to prodding the manufacturer to supply them with standard material at lower cost, and to place at their disposal other material which would enable them to expand into a more ambitious field. They would be co-operating through a third party. Naturally, the question of policy enters largely into consideration of this view and doubtless the course to be pursued would differ in individual cases. Nevertheless this does not alter the central idea. Should the manufacturers, dealers or contractors so desire, and the circumstances warrant, they could even get together and contribute to the formation of an entirely separate company which would manufacture material used in common by all, or a large percentage of them and through their prorata ownership of the stock of the company, they could control the decision as to just what parts would be manufactured on the co-operative basis and arrange for the most economic method of manufacture and provide for the obtaining of the lowest cost either through the price charged by the separate company or in return of dividends. If this were attempted on a large scale it might conceivably develope objectionable features, but if such an organization were open to all who wished to enter and was conducted along sound commercial lines, it might be entirely feasible. Some such organization might also handle certain advertising, common to the interests of that entire branch of industry. Some co-operative advertising is now done and an example of this which comes to my mind is that of the half dozen manufacturers of cast iron pipe. Possibly manufacturers might do this with particular advantage at the present time with respect to advertising for foreign trade, including in the printed matter, name and address of each of the contributing manufacturers, to insure against any suggestion of particality in the distribution of results.

In this meeting when we speak of competitors, we probably have in mind manufacturing concerns. We much recollect however that not only they and bankers, politicians, engineers and transportation lines compete, but that individuals are taught to compete from their earliest childhood. The idea is instilled as a spur to ambition and an economic method of furthering advancement. We compete for social favors or for recognition of prowess or mark of public esteem. In the sports we find the keenest of competition and among the best of sportsmen we find the greatest measure of co-operation. The home team while doing its best to distance the visiting team in competition will cooperate with the visitors in every way to provide for the best display of their energies. This was splendidly illustrated in the recent International Polo Matches. This is for the good of the sport and the prize is the more highly esteemed. The spirit of the game has a more enviable place in commercial business than the spirit of conquest. Co-operation makes for a better spirit of the game. Co-operation need not and should not submerge individuality, but should render that individuality more efficient. Acquaintance is an asset and acquaintance is stimulated by co-operation, and if this co-operation exists between competitors, an acquaintance results among the very men who should be acquainted in order the more rapidly to increase the assets of all. This assemblage represents efficient co-operations and if amongst it are represented a number of competitors it has in so much at least made plain its recognition of the advantage accruing from co-operation between competitors.

CO-OPERATION BETWEEN COMPETITORS.

Mr. Dawson: Gives his views of the co-operation between fire insurance companies, as follows:

1. A combined fire patrol in all cities of any importance
2. A combined effort for the production of fire maps.
3. A combined effort in the direction of standardizing fire proofing.
*5. Combined effort for the salvage and wreckage of goods damaged by fire.
4. A combined effort to superintend the installation of electric light, thus preventing accidents.
6. Combined adjustment of fire loss.

*By wreckage and salvage is meant the preserving of the damaged goods and keeping them in as good order as possible, and then selling them at the best terms possible.

Mr. Weicker: In Germany the workmen's compensation or accident insurance system is established by means of a group of industries. They were forced by the Government to run their own accident insurance, and the result has been an extensive and valuable organization of these industries coming together for things that they could accomplish better collectively than in competition.

Dr. Dewey: "No man liveth for himself alone." Men who work together usually achieve the highest success. We all try to get together, as in the example of the formation of small hamlets, towns, cities, states, nations.

Mr. McCormick: The agitation that is going on this year stronger than ever before, is for the Government to have a business department. The start has been made; Harvard University has been making very intense studies on certain phases of business, with very good results. They have completed studying the shoe industry and they have now started on the grocery business.

Mr. Dawson: There is a bureau in Washington called the Chamber of Commerce of the United States, which is glad to give any information desired on any kind of business. They have investigators who are endeavoring to get the correct answers.

EFFICIENCY SOCIETY Inc. PSB-16

Scientific Management and the Labor Problem (Kent)

2-4-15

Abstract of an address by Mr. Robert Thurston Kent, delivered before the Cleveland Chamber of Commerce. Printed by permission of the author.

Scientific management is a movement which offers the only permanent solution of the differences existing today between capital and labor, between the employer on one hand and the employe on the other. These differences range all the way from the small strike or lockout to states of actual warfare, with a resulting loss to the community of hundreds of lives and millions of dollars. It is not putting the case too strongly to call it warfare. In the anthracite coal strike, a prominent labor leader justified certain acts of the striking miners on the ground that they were acts of war. And today in Colorado we have the spectacle of the armed forces of the labor organizations in conflict with the armed forces of the state and nation.

For years we have heard until we are weary of it the statement that the interests of capital and labor are identical. Well meaning persons have repeated it in season and out of season and have attempted to show by marshalling logic and figures that the workman is foolish to quarrel with his employer. Logic is of small use in dealing with men who believe they have enlisted in a righteous cause, or who have had their passions stirred by bitter conflict with those whom they have been taught to regard as their natural enemies. The time has long since arrived when something more than talk and logical arguments are necessary to convince labor and capital of the truth of the trite saying just quoted. They must be given a demonstration of its truth, a demonstration which cannot be denied, and which will convince even the most reluctant doubter that the prosperity of one is bound up with that of the other. This is exactly what Scientific Management does, and has been doing for many years. It has demonstrated to the employer that prosperity for himself comes with prosperity for his employes, that high wages do not necessarily mean high cost of production. It has demonstrated to the employe that he is not endangering his own interests by taking care of those of his employer, by producing the greatest amount of output of which he is capable. This demonstration exists wherever Scientific Management is in operation. It is not necessary for employer or workman to take the word of anyone regarding this. Go and see for yourself.

IMPORTANCE OF THE HUMAN MACHINE

For many years the standard definition of engineering has been Tredgold's famous statements, "Engineering is the art and science of utilizing the resources of nature for the benefit of man." Many years later an American engineer amended Tredgold's definition to read, "Engineering is the art and science of overcoming the resistances of nature—including human nature." The difference between the old and the new definitions of engineering represents an almost exact measure of the differences between the old and the new attitude toward our workmen. From the birth of the steam engine and the institution of the factory system, up to but little more than a decade ago, the attention of engineers and designers has been concentrated upon the mechanical problem, upon the improvement of machinery and the increase of production by means of machinery. Little or no attention has been given to the man who ran the machine. But in the last ten years, since the work of Taylor startled the world, we have come to realize that in devoting all our attention to the mechanical things we have neglected half of the problem, and perhaps the more important half. We have neglected the human machine, which under capable, intelligent direction will so improve the efficiency of the other machine that profits will be enormously increased to the benefit of employer, employe and the entire community. And this is the field of Scientific Management. It looks after the *man* who runs the machine, and improves his efficiency just as the engineer prior to 1900 sought to improve the efficiency of the machine which was run by the man.

And how is Scientific Management to solve the problem which has arisen between capital and labor? The answer is simple; by improving the efficiency of the workman; and in so doing by removing all causes of dissatisfaction to either party; by dealing out absolute and evenhanded justice to both, and doing it by applying the methods of science to the handling of the workmen. It deals with facts, not with theories. You cannot quarrel with facts, and Scientific Management will have nothing to do with anything that is not a fact.

The Creed of Scientific Management

The creed of Scientific Management is brief but it is very comprehensive. It has four main parts. (1) "Each man in the establishment, high or low, should daily have a clearly defined task laid out before him. This task should not in the least degree be vague or indefinite, but should be carefully circumscribed and complete and should not be easy of accomplishment." Pay particular attention to two expressions in this clause: the first "each man in the establishment, high or low." and the second, "the task should not be easy of accomplishment." The laws of Scientific Management apply equally to the president of the company as to the humblest laborer in his employ. (2) "Each man's task should call for a full day's work, and at the same time the workman should be given such conditions and appliances as will enable him to accomplish his task with certainty." (3) "He should be sure of large pay when he accomplishes his task." (4) "When he fails to accomplish his task, he should be sure that sooner or later he will be the loser by it." We sometimes add a fifth item to this creed as follows: "When an establishment has reached a high state of organization, the task should be so difficult that it can be accomplished only by a first-class man." Around these five propositions hang all that has been accomplished in the last ten years which has brought this country to a high state of prosperity, which has resulted in the efficiency of American industries and of the American workman becoming a household word.

Why the Workman Opposes It

It is not strange that Scientific Management has met bitter opposition from the working element. But is strange that it has been opposed by their so-called antagonists—the employers. We can comprehend, in a measure, the workman's object in opposing it. Ever since the factory system has been instituted, the workman has been exploited by his employers. He has been compelled to labor for long hours; he has been compelled to work under what he calls the crowning iniquity—the piece work system. He has been compelled to accept cuts in his piece rates whenever, by industry or ingenuity, he has succeeded in making more money for a day's work than his employer thought proper. In the not-distant past it was only by the formation of powerful unions, able to fight the employers on their own ground, that the workman was able to raise his wages and to decrease his working hours and to make working conditions such as the normal American cares to spend his days under. Every new device that the employer has brought forth, in times not so far distant, has been used for the exploitation of the workman. It is not strange, therefore, that the workman looks on his employer with suspicion when we tell him we have discovered something new; something that will improve his condition and raise his pay. We can hardly blame him when he says that this is just some new thing to "do" him.

Scientific Management boldly claims that it makes a workman do more work in a day than he formerly did. It states without apology or retraction that the workman does not do all that he is capable of doing. It claims that it will reduce the cost of the unit of product of the factory in which it is employed; that it will increase the output of that factory with a decrease in the number of men and without any increase in the equipment. It is strange, therefore, that the employers look on it with suspicion. Nevertheless, Scientific Management has more trouble in the plants in which it has been instituted with the officials higher up, with those in authority, than it has with the workmen; and these are the men, whom, on the face of matters, you would expect to be the greatest gainers by it.

The Solution of the Labor Problem

Scientific Management will solve the labor problem because it gives to both sides exactly what they most ardently desire. The workman desires above all other things, high wages and short working hours. The employer desires for his plant the least possible cost of production and the maximum output for a given expenditure of money for labor and materials. Scientific Management gives exactly these things, and when it is thoroughly understood, when what it really means is appreciated, when the suspicions which both sides have for it have been eradicated, then we will be in a fair way able to settle the labor problem.

Let us resort, for a moment, to our definition or creed of Scientific Management. Each man in the establishment, high or low, should daily have a clearly defined task laid out before him. The task is the basis of Scientific Management. The task, as we understand it in Scientific Management, is not something disagreeable, something to be done under compulsion. It is simply a statement of the work which is laid out for the workman, the job which he is required to do within a given time, together with a statement of how he is to do it.

For example, take the trade of the machinist. The machinist, in his work, is required to make use of tools involving many motions. He is required to make use of processes founded upon the most abstruse sciences. It is beyond belief that the ordinary machinist can, with the limited knowledge at his disposal, reconcile all the many factors which enter into the handling of his tools and the variables of the sciences which he employs in the manipulation of his machine, so as to obtain the best combination of circumstances which will permit him to produce with that machine the maximum quantity of work. For instance: The product of a lathe depends upon twelve variables, any change in any one of which will materially alter the conditions under which the machine works. Thus, the shape of the tool which is used in the machine will have an effect upon the output; the quality of the metal which is being cut; the speed at which the machine is driven; the tension in the belt; the depth of the cut; the feed of the machine; whether or not the tool is cooled by a stream of water; all these have something to do with whether or not the machinist turns out the most work of which the machine is capable. It is not to be expected that the machinist, being given a piece of work, can immediately tell what combination of the factors enumerated above are the best. It took an investigation extending over 26 years and requiring the expenditure of a quarter of a million dollars and the cutting into chips of 800,000 lb. of metal to determine what was the best form of tool to use in the lathe and the best material of which to make this tool. This is where Scientific Management comes in. It discovers the laws relating to the utilization of all the mechanics of labor and applies them in the most efficient manner.

What is Required of the Man

Our friends in the labor unions contend that we destroy the manhood of the workman; that we shatter his initiative; that we make him more mechanical than the machine which he runs. We deny these assertions and ask, does it destroy the manhood of a man to tell him to put his belt upon a certain cone step of a lathe? Does it shatter his initiative to tell him that a certain shape of tool will produce the best results? Is it discrediting him to tell him that his machine will stand a feed, a depth of cut or a speed which he did not believe was possible?

Scientific Management co-relates the best knowledge in the art up to the present time and requires that those working under it work according to the laws deduced from this knowledge. The initiative of no workman is destroyed. On the contrary, we welcome suggestions from the workman. We are willing and anxious to reward those men who have developed initiative sufficient to improve upon the methods which we have at the time considered the best. We realize that knowledge is cumulative—that the standard practice of to-day may be obsolete to-morrow. We are willing to accept any improvements from any workman. All that we ask of him is that he demonstrate his good faith and his knowledge of present methods by accomplishing the work that we lay down for him according to our best knowledge at the present time. Therefore, when we lay out a task, we simply tell the workman what can be done, what has been done by other men as good as he, and require him to do it. We have found that when this is done that the average workman, the ordinary every-day workman in the shop, can produce from two to three times as much as he did before.

The Full Day's Work

Let us now consider the second item of our creed. "Each man's task should call for a full day's work and at the same time the workman should be given such conditions and appliances as will enable him to accomplish his task with certainty." We will not dwell long upon the subject of the task calling for a full day's work. You, who employ machinery in your factory, know full well that you receive the greatest benefit from it when it is running continuously. There is no profit in machinery which stands idle. Likewise, regarding the workman for a moment as a part of the machine, there is no profit if his task does not call for the utilization of his full time. Do not gather from this that the worker should be crowded; that he should be busy every instant of the day. What we do mean is that he should not be idling when there is useful work than he can do without injury to his health. We shall speak of fatigue a little later.

What we do wish to lay stress upon in this second item of the creed is this: "The workman should be given such conditions and appliances as will enable him to accomplish his task with certainty." You employers, who may have contemplated the adoption of the methods which we to-day call Scientific Management, should ponder long and deeply over this clause. When you install Scientific Management in a shop, you impose a far greater burden of responsibility upon yourselves than you do upon your workmen. You lay down for them tasks which they are required to accomplish under penalty. These tasks, if set by men who know their business, are tasks which have been formulated under laboratory conditions. They are tasks which can be accomplished only by first-class methods and first-class tools, for Scientific Management will stand for none other than these. If then, you require your workmen to accomplish tasks which have been set to a high degree of accuracy, and do not at the same time furnish them with equipment, with tools and with methods, and instruct them if need be in the methods under which the standard was set, then you have failed in your duty to them and you cannot and should not expect the task to be accomplished. If you attempt to require them to accomplish without proper tools and equipment tasks which have been set under hard conditions, you will surely come to grief and Scientific Management will have scored against it another so-called failure.

The Responsibility of the Employer

Scientific Management is founded on the square deal; it champions neither labor nor capital, employer nor workman; it deals equal justice to both. The workman, as a rule, will do as he is told, particularly if he knows it is going to result in higher wages and better working conditions for him. The man above the workman is not so amenable to reason. Scientific Management makes him do things which he never did before. It puts on him the responsibility of finding out the best methods, of discovering the laws governing the work of his factory. It puts on him the enforcing of these laws, and it takes from the workman many things which the employer formerly considered were necessary for him to do. The experience has been almost uniform that it was the men in high positions in their establishments that offered the greatest difficulty, and the difficulty usually varied in direct ratio with the authority of the men. The president of the company is usually the hardest one to convince that Scientific Management's laws apply to him as well as they do to his men.

The third and fourth items of our creed are: "The workman should be sure of large pay when he accomplishes his task; when he fails to accomplish his task he should be sure that sooner or later he will be the loser by it." If we pay workman $2.00 a day for doing what is considered a full day's work according to the standards of his trade and then suddenly introduce him to methods by which he will accomplish double that amount of work, we can hardly expect him to accept these new methods with enthusiasm if he is to get the same $2.00. Neither is it fair to expect him to do so. While I am not ready to accept the doctrine of our socialistic friends that all the wealth of the world is produced by labor, yet I am entirely willing to grant that labor should receive its full share of what is due it. If we double the output of our factory by scientific methods, we should share in some way the profits with the men; for it is not to be denied that doubling the output without increasing the equipment is adding to the profits of the owner. The workman should be rewarded by a bonus which will compensate him for his extra effort in accomplishing this large output.

On the other hand, if he refuses or is unable to make use of the improved method, which the owner has spent good money in acquiring for their mutual benefit, then he should be penalized by the loss of his bonus, and in certain cases by the reduction of his daily pay. Scientific Management has no place for the slothful. It desires only first-class workers and is willing to pay highly to get them.

The Case of the Second Class Man

"But," we hear our union friends argue, "how about the second class man, the man that is unable to reach the standard of production required by your new methods? Is he to be allowed to starve?" Not a bit of it. One of the things that Scientific Management does is to instruct those men who cannot accomplish the task laid out for them in the methods by which they can finally accomplish it. Every second class man is a first class man at some kind of work. The province of Scientific Management is to discover what this work is. It frequently discovers, and this may be proved by statistics of a number of plants, that workmen are employed on jobs for which they are neither physically nor mentally fitted. Scientific Management discovers these discrepancies and removes the man to a job for which he is better adapted. There is work in the world for every man, and one of the things that Scientific Management does is to find it for those who are under its charge.

How then is Scientific Management to accomplish the object which we stated at the beginning of this address was possible. How is it to end industrial warfare. By dealing out even-handed justice to both sides of the labor controversy. It determines exactly what is a fair amount of work for a man to do in a day. It determines exactly what is the proper compensation, every factor being taken into consideration for his work. When it has deduced by patient, careful and painstaking study, the laws governing the work in any plant, it insists that all work shall be done in accordance with these laws. It insists that the employers deal justly by the workman; that the workmen render to their employers a just equivalent for the remuneration they receive. It is different from all other methods in that it provides a definite unit of measure—it does not depend upon guess-work as to the amount of work a man should do in a day or what wages he should receive for that work. It determines these facts in a scientific, cold-blooded manner. It is not leaning one way or the other; it deals with facts and facts alone, and by dealing only with facts, it removes one of the greatest causes of controversy as to wages and hours of labor.

This is not theory. The record stands today of hundreds of plants operating on the principles just set forth. In every one of these plants, the men are receiving from 10 to 40 per cent more money than men in the same trades in the same city, who are not working under the principles of Scientific Management. The record will show that the plants operating under Scientific Management where they are in competitive businesses, can usually dictate the prices in their market. The record in these plants where Scientific Management has been installed in its entirety, where there have been no reservations on the part of the employer or evasions on the part of the men, shows that the men are happy, and contented, have no need of the unions and prefer to get along without them.

"Speeding Up"

Before concluding we should answer the charge made by labor leaders that Scientific Management is a device for speeding up the workmen, for taking all the good from them and throwing them on the scrap heap. The governing foundation of Scientific Management is the law of fatigue. In the 30 years of hard work and study which went on before the science of management was established as a science, little progress was made until it was discovered that the one thing that must be considered in setting a task that could be accomplished with certainty day after day was the fatigue induced by work and the period of rest which was required to overcome the fatigue due to the work.

It was not until the law of fatigue was established that any great progress was made in the setting of tasks that could be accomplished with certainty. Now, in every task that is set, the proper allowance is made for the fatigue that will result from the work, and the task is so set that the worker will be

able to do his best without becoming so fatigued that his health is undermined or his efficiency diminished. The tired man is not the efficient man, and therefore we take care to guard the worker against becoming so tired that he is inefficient. How then, I may ask, can the labor leaders claim that we are speeding up the men to a point where we ruin their health, when the first thing that we consider is the fatigue that this work engenders, and how much rest must we give each workman in order to ensure that he can keep up at his maximum efficiency? If we ruin the health of a workman, we certainly cannot expect him to remain efficient, and the efficient workman is what we desire above all others.

EFFICIENCY SOCIETY Inc. PSB-17

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Personality In Organization (Emerson)

2-16-15

An address before Efficiency Society, November 24, 1914, by Mr. Harrington Emerson.

On the subject of personality in organization I have strong opinions which I carry into practice.

Organization and personality are mutually dependent. They remind me of the mutual dependence between vegetable and animal life. Microscopic vegetables called bacteria are, many of them, intensely hostile and destructive to animal life. Very small individual animals are intensely destructive to vegetable life, but the two great races of plants and animals have after millions of years effected a truce under which the plant bribes the individual animal to serve the plants race needs.

Recently I was sailing over Western Massachusetts in a balloon. I saw fields and roads far more plainly than when I travelled along the ground, I saw forests far more plainly than when lost in their gloom and I understood the nature of the trees far better when we made hundred yard leaps from tree tops to tree tops than when lost in the underbrush.

It is from the historical and scientific balloon point of view that I intend to survey the relations of the originally antagonistic organization and personality.

Personality needs an organization that both may be stronger. Organization demands a very strong and fit, yet harnessed, personality that both may accomplish a great work.

In our American life we know very little of this correlation of organization and personality. Strong personalities coming to this country in by gone centuries were like strong horses that had broken loose from the trammels of harness and control. Conditions of life were primitive and men needed little more organization than that sufficient for a pack of wolves, so they cheerfully scrapped most of the knowledge and much of the morality of the past, as they also cheerully scrapped the accumulated community wealth of the past.

Our government itself was founded on a negation of many of the fundamentals of good organization. We flouted the idea of permanence, of special fitness of responsibility and of authority, the idea of balance of human qualities never entered our heads.

In the mean time each strong and successful personality, while more or less strictly obeying the fashions as to clothes, evolved his own organization very much as he designed and built his own log cabin, without architect, and without tradition, and without the slightest knowledge that the pyramids were still standing, that the most perfect building the world ever produced was still standing although shaken by earthquakes and shattered by powder explosions, that St. Peters at Rome was still the greatest church in the world, that the Taj Mahal was the most beautiful structure ever erected by man, jewelry in stone.

We have made good progress at last, but it has taken three hundred years to pass from log or sod cabin to Woolworth Building, and as to organization we are still in the architectural condition of New York a hundred years ago.

Yet certain forms of organization are as old as matter itself, the organizations of Bacteria and Monera into plants and animals are as old as life, the tree is one of the finest samples of ramified organizations known, the Catholic Church has endured and flourished and grown for nineteen hundred years.

There is an organization, the Prussian military system, founded on the negation of personality that has given the most wonderful example the world has ever seen of preparedness, with 5,000,000 moving with the precision of an Ingersoll dollar watch.

There is one organization in the whole world that has been standardized, that is internationally inter-changeable, that as far as I know is the best model the world has yet given us, the naval organization, good because no man can go alone to sea in a boat, and no men can brave the sea and neglect any wisdom, as the recent loss of the Titanic and of the Audacious shows.

Our railroads are said to be the life industry of our country, and so they are, yet scarcely two American railroads have the same organization, notwithstanding all the efforts of the Inter-State Commerce Commission, and the railroads of Great Britain, of France, of Germany, of Russia are organized so differently that comparisons of operation are impossible and interchangeability of place also impossible. Yet it is solely owing to difference of a small detail of organized control that America runs too enormous locomotives and enormous cars while Europe is content with small locos and small cars, and the present plight of our American roads is due to that one little detail of administration.

I am not going to speak of types of organization nor of types of personality, but of the relation of personality to organization.

They must be fitted together as hand into glove, and not as fist into mitten. No, this comparison gives a false idea, for the glove is designed and made for the hand, but correct organization is infinitely older than the hand, older than humanity, older than life and the problem is to fit the variables of humanity into the organization.

An automobile, a watch, a typewriter, an adding machine is an organized collection of pieces of metal, and if all the pieces, of the car, of the watch, of the typewriter were dumped into a big heap with 10,000,000 other pieces of all kinds of materials, we could only make up the perfect car, the perfect watch, the perfect typewriter by carefully seeking, finding, and fitting together the collated parts.

We could easily cobble together a wheel-barrow, or a sun dial, or a metal name stamp, and that is about the way American organizations are cobbled together.

It has been said of Steve Elkins that he had two great principles of action.

1.—If he saw anything he wanted, he went out after it.

2.—He brought it back home with him.

These are tremendous and splendid principles of personality. The first is evidence of great virility, the second of great ability, and the combination is a fine one.

But, other questions have to be determined.

First.—What was it that he saw that he wanted?

Second.—By what means did he propose to get it?

There are six different ways of getting what we want.

(1) By finding or discovery.
(Seek and ye shall find.)

(2) By persuasion and offer of reward.
(Ask and ye shall receive.)

(3) By intimidation and threats.
(Thou shall not serve any other God for I visit the iniquities of the fathers upon the children unto the third and fourth generation.)

(4) By inheritance.
(Lift up now thine eyes and look northward, southward, eastward and westward, for all the land which thou seest, to thee will I give it and to thy seed forever.)

(5) By exchange and purchase.
(Abraham weighed four hundred shekels of silver, current money with the merchant and bought the field and the cave and all the trees.)

(6) By force.
(Therefore kill every male even if a child, so they burnt all their cities wherein they dwelt and all their goodly castles and took all the women and all their little ones and took the spoil of all their cattle and all their flocks and all their goods.)

Incidentally I call to your attention that panthers and bears and wolves have long since disappeared from civilized neighborhoods, but rabbits and deer and other quiet animals, as well a sthe unusually intelligent fox still linger among us.

Therefore when you see something you want make up your mind by which method you intend to bring it home and organize accordingly.

The greatest wealth in all the world comes through inheritance.

We have inherited our morals, our knowledge and our material possessions. The newly born babe is a filthy little animal, which without the training of past experience which we call morality, without our preserved knowledge and our accumulations from past labor would grow no better and little more intelligent than wolf or fox.

The next greatest opportunity comes from discovery. The universe is teeming with wealth so vast that all the existing wealth is not to be compared with what has not yet been discovered. Of the six methods four are good and two bad.

I rank the four good methods in their order
Persuasion
Inheritance
Discovery
Exchange

The two bad methods
Intimidation
Force.

The whole Prussian military system is founded on intimidation and on force.

Whosoever shall offend one of these little ones, it were better for him that a millstone were hanged about his neck and he were cast into the sea.

He that draws the sword shall perish by the sword.

Having decided on what you want and how you are going to bring it home you are ready for an organization to help you.

The essentials are

All the available knowledge in the universe that is necessary to be available to every material, tool, machine or man needing it.

Authority to make the knowledge worth while in the attainment of the aim.

For every single position design the functions and specify the characteristics required.

We realize that in every position there must be either in one person, or in several, a combination of physical appeal, of social appeal and of mental appeal. In this country we must persuade, we cannot intimidate or compel.

We must erect screens to keep out the unfit, and we must put in amalgams and magnets to attract and hold the fit. The fit must be tested and must be conserved after test, they must be put into operation and be inspected in operation. These are our methods as to materials and as to equipment, they are also our methods as to personnel. We try to pick them out more carefully than a base-ball team, or a foot-ball team, or a circus aggregation is collected, every one a star performer for the particular position.

The man who makes his money by racing horses has for a hundred years past carefully observed the principles of selecting I am now advocating. He would rather put up his money on an unfoaled colt than take a thousand to one chance on an unknown plug. The race horse man has overlooked nothing.

After I have found the best man in the whole world for a predetermined place I standardize conditions and operations and expect from him, as a matter of course, the normal and joyful best that is in him. Race horses love racing, hunting dogs love hunting, the selected man in suitable organization loves his work, and when a man loves his work it is almost impossible for him not to flourish in it.

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Efficiency of the United States Navy (Knight) 3-3-15

From an address by Rear Admiral Austin M. Knight, U. S. N., at the Annual Meeting of the Efficiency Society, January 25, 1914.

It is not my intention to go into questions of the efficiency of individual ships, the results of target practice and kindred topics. I propose to deal with the efficiency of the Navy as a whole, considering it as a great and very complicated machine, upon which hundreds of millions of dollars have been expended, with one end in view, and only one—the development of a supremely efficient weapon for the defense of the country against any and every enemy which may come against us.

I was asked a few weeks ago what the War College considered that the Fleet should do, and I replied:

> "The War College considers that every effort of the Fleet, and every effort of the Department in connection with the Fleet, should have for its sole aim the war efficiency of the Fleet. Every effort which does not directly contribute to this end is in itself a wasteful expenditure of energy, and, so far as it is a diversion from this end, is distinctly harmful."

No doubt there are many differences of opinion as to what constitutes an adequate Navy for the defense of the United States. There may even be some who think that we should have no Navy at all. But on one point I am sure there will be no difference of opinion,—that if we are to have a Navy, it should be as efficient as it can possibly be made. And everybody who knows anything about the Navy knows that this is not its present condition. I am not one of those who hold that it is altogether inefficient. Unsatisfactory as conditions are, it would be very easy to exaggerate them. When things are wrong you can always find extremists to tell you that they are much worse than they actually are. Some people think that this is the only way to make an impression. Others are so constituted temperamentally that they can see nothing good in anything which falls short of perfection as they see it.

I am going to assume that you occupy a reasonable middle ground so far as temperament is concerned, and that to make an impression upon you I need not do violence to my own temperament by painting the picture which I shall draw for you in maximum contrasts of light and shade.

There is much about the Navy which is splendidly efficient. But as a whole it is far less efficient than it can and ought to be. Our ships are fine. Our Officers are capable, industrious and ambitious. Our enlisted men are the equals of those in other navies. But efficient ships and officers and men do not alone make an efficient Navy. They must be welded into an efficient whole by a unity of organization and administration and purpose which co-ordinates their capabilities and directs their efforts toward a common end, wisely selected and very clearly seen. Here is the first point at which we are lacking. We are lacking also, in that harmonious composition of the fleet which is needed to give to every element of it the support that it needs from other elements, to make up a symmetrical and well-balanced whole. And we are lacking to a marked degree in absolutely essential facilities for the care and preservation of our ships, especially in the matter of dry-docks.

Finally, we are lacking in efficient organization of the personnel. Here, so far as Officers are concerned, the conditions are altogether deplorable. In a service like the Navy, where *spirit* is everything, where enthusiasm must be the driving power back of every activity, I ask you to picture the effect of a condition where a young officer, graduating from the Naval Academy full of spirit and enthusiasm, finds himself confronted with a prospect of promotion to the grade of Lieutenant at the age of 52 years.

If you ask me who is responsible for these conditions, I can only reply that the responsibility comes home to nearly all of us. Some of it, I am sure, rests with me;—much of it, I believe, with you. Certainly it cannot be attributed in excessive measure to any one administration of the Navy Department, for it has existed for half a century at least. So let us not cloud the issue by assuming that it is a new condition, and that all administrations up to some recent date have been models of wisdom and efficiency, or that Naval Officers themselves have always been ready with good advice. Speaking as the representative of Naval Officers as a body, I frankly admit that we have not always seen clearly what was needed and have not always worked together even for ends which we did see clearly. As for the Secretary of the Navy, it is not surprising that many of them have failed to realize that their first duty was to strive, in season and out of season, to promote the War efficiency of the Navy as a whole. Many of them have not remained in office long enough to learn this. Some, perhaps, have realized it more or less clearly but have not found at hand an organization thro' which they could produce results. A few have made material contributions toward improved conditions. I shall have the pleasure a little later of calling attention to one important step in advance which was taken by the present Secretary at the very beginning of his term of office.

A large part of the responsibility, especially that connected with the small size and the unbalanced composition of the Fleet and the lack of dry-docks, rests with Congress, which has always approached naval legislation from the wrong side so far as efficiency is concerned;—asking, not what do we *need* for efficiency? but what can we afford to spend for efficiency? Behind the responsibility of Congress, lies the responsibility of the Country,—and you, gentlemen, represent the Country—because it has not insisted upon having what was needed, without reference to cost. It may be that this attitude of both Congress and the Country is necessary and even inevitable. But I am one of those who believe that this great Country of ours can afford to have anything in the way of national defense which it needs, and I assume that all agree that we need a Navy and if a Navy, then an efficient one, and that whatever efficiency costs is the measure of what we can afford to spend.

One particularly unfortunate feature about the application of the policy of "economy first" in naval expenditures is that it has often been invoked to prevent a small appropriation which would have added many times its own cost to the value of those items for which money was cheerfully appropriated. I shall discuss this more at length hereafter.

But after all, is it not rather futile to spend our time in trying to place responsibility for existing conditions? It seems to me that what we ought to do is to recognize the conditions clearly—neither exaggerating nor minimizing them—and to dissociate them absolutely from personalities. We can then proceed, with a perfectly open mind, to consider how the conditions can be improved.

I ask you to accept this point of view and to banish from your mind all thought of politics and every trace of partisanship, and fix your attention upon the question before us as one of national, not of political significance.

The conditions, then, to which I shall invite your attention are those connected with:

1st, the Size and Composition of the Fleet;
2nd, the Organization of the Personnel.
3rd, the Organization and Administration of the Navy Department.

THE SIZE AND COMPOSITION OF THE FLEET.

First as to the size of the Fleet. I shall not go into this very fully because my subject is not so much adequacy as efficiency. A small machine may be efficient within the limits fixed by its size. It is from the point of view of efficiency within the Navy as it exists that I wish chiefly to consider my subject. It must be recognized, however, that the actual efficiency for war of a battleship fleet which is efficient within itself may be seriously compromised by the lack of those supporting units which are vitally essential to its operation. There is, moreover, a sense in which we may say that a machine is not efficient if it is too small for the task for which it is designed.

What constitutes an adequate Navy for the United States? The answer will depend, of course, upon the purpose for which we assume that the Navy is to be used. We are all agreed, I presume, that it is not to be used for aggression. Is it, then, to be used solely for defense? If we answer "yes", we ought to do so with a full recognition of what we are to defend and also of the elementary maxim that the best defense is a vigorous offense. In other words, no matter how resolute we may be to use our Navy only for repelling aggression, it does not follow that we should plan for meeting the aggressor only at our gates. Even if we had no interests outside our borders and no responsibilities for the defense of our outlying possessions and dependencies, we should still, as reasonable beings not wholly ignorant of history, prepare to project our battle line toward the enemy's coasts and to assume a course which would throw upon him the burden of replying to our initiative. In this sense, then, we need a Navy for offense; that is to say, for offensive action with a defensive purpose. In shaping our plans along these lines, we should not overlook the fact that the policy which dictates the measure of our defense must take full note of the larger national policy which it is to enforce;—in relation, for example, to the Monroe Doctrine, the Panama Canal, the Philippines, and other matters which are at once of national and of international significance.

The statement is often made,— I have heard it made on the floors of Congress—that Naval officers themselves do not know what they need. There are, naturally, differences of opinion among naval officers as to what the strength of the Navy should be and as to the types of which it should be composed. But the country has, in the General Board, a body of mature and experienced Officers whose business it is to study this question and to speak authoritatively upon it. In the main, the recommendations of this Board from year to year have been consistent with each other and consistent with the best naval sentiment. It has stood, since 1903, for a fleet of 48 battleships and necessary smaller units and auxiliaries. The character of the smaller units and auxiliaries recommended has varied from time to time, following the developments of naval art and science; but the basis of 48 battleships, to be kept up to date by eliminating ships more than 20 years of age and replacing them by new construction, has been steadily adhered to. Now it may be that we need fewer than 48 battleships or that we need more. Whatever their number is to be, we should have a policy in the matter, looking as far into the future as practicable, and one which, in providing for capital ships, provides also for the smaller units and auxiliaries to round out the Fleet into a complete and well-balanced whole, with an appropriate number of cruisers, scouts, destroyers, submarines, colliers, tank ships, supply ships, repair ships, mine-laying ships, tenders and gunboats.

The program advocated by the General Board would, if it had been followed, have given us 47 battleships, built and building, in 1914. This program has not been followed, and we have at present 37 battleships instead of 47. It seems to me that he would be a bold man, who, recalling the history of the last days of August, 1914, when the world passed within a week from a condition of universal peace to one of almost universal war, should say that we do not need the full number of battleships proposed by the General Board,—and more!

But battleships alone do not make up a fleet,—much less a Navy. A fleet without fuel-ships is crippled and one without scouts is blind. It can neither secure information of the enemy's movements nor deny information of its own. To send a fleet thus blind and crippled into hostile waters would be to invite destruction. We have an altogether insufficient number of fuel-ships, and practically no scouts. Moreover, we are very weak in destroyers, of which a large number should accompany the fleet, to back up the scouts, to act in part as scouts themselves, to stiffen up the screen about the battleships, and to be ready for a dash against the enemy when an opening is presented. The effect of the conditions actually existing is to almost completely nullify the power of our fighting ships. Picture to yourselves the plight of a battleship fleet operating in hostile waters against a fleet much smaller but with all its elements complete. The smaller fleet, with scouts thrown out a hundred miles or more around its main body, every scout in touch with every other one and with the Commander-in-Chief, and with a horde of destroyers backing up the scouts and awaiting the word to attack, would gain and keep touch with the larger fleet, while itself evading discovery, and would send its destroyers in at night—unchecked and unnoted by any protecting screen, to drive home an attack which might decide the issue without the main fleets ever having seen each other. And if nothing of this sort occurred, consider the situation where the fleet, with its fuel-supply exhausted, finds itself without a reserve supply on which to draw.

There is a wide-spread and very dangerous opinion that all the fuel-ships and scouts we need can be improvised, on short notice, from merchant vessels. This is one of those miserable fallacies based upon experience in the Civil War and the Spanish War, in both of which we won because our opponents were even more grotesquely unprepared than we were. The Civil War was, I suppose, the most costly war ever fought; and the most unpardonably wasteful in money and in human life. But its cost did not end with the end of the war. Apart from the tremendous pension list which our pacifist friends insist upon charging up to what they are fond of calling militarism,—altho' it was really the direct result of the criminal folly of unpreparedness,—apart from this is the indirect cost of the perpetuation of that folly. Since we were successful in that war,—so the implied argument runs,—our preparation for it must have been of the kind that makes for success, and we can look for success hereafter from the same policy. To these gentlemen I commend the perusal of a book called "The Military Policy of the United States" by General Emory H. Upton. If any of you have failed to read this book, I urge you to read it at once. It exists in conveniently available form as Senate Document No. 494, of 62d Congress, 2d Session. It would be interesting to know how many Senators have read it. It is the best antidote I know for the monstrous delusion which sees in every American citizen a soldier, trained, efficient, ready to take his place in the ranks at a moment's notice and sweep the loathed invader from our soil, and in every ship that floats, a potential man-of-war complete in everything but guns.

By what seems almost a misfortune, in view of its effect upon the minds of many of our people, the delusion that we, alone of all the nations of the earth, can carry on a successful war without preparation, was confirmed by our easy victory in the Spanish War,—our opponent again being as unprepared as we were. I should be sorry to agree with those who hold that nothing short of an overwhelming defeat in some future war will ever open our eyes to the danger of existing conditions, and I wish to do my part toward opening the eyes of my countrymen before such disaster comes. We must recognize the fact that war is an art and a very highly specialized art. For every task which it involves, there is a need of special tools, efficient in themselves and contributing to the efficiency of the whole organization. And these cannot be improvised. Yachts, tugs, and ferry-boats can perform certain duties in waters close to our own coasts when they are absolutely unopposed. And any steamer capable of carrying a thousand tons of coal can get the coal to a fleet which is lying quietly outside a quiet port with no threat of interruption to its lines of communication. But no language is strong enough to characterize the fatuity of relying upon such tools for carrying on a real naval war. It is true, no doubt, that there are many fuel-carrying ships that can be utilized by the Navy in time of war. But let us consider briefly the characteristics which they should have, and then inquire how many of them we would probably find available in our waters on the sudden outbreak of war. First of all, a goodly proportion of them must carry fuel-oil instead of coal or in addition to coal. Second, they must be large. A great number of small craft, manned by untrained crews and commanded by untrained officers might be a fatal handicap to a fleet operating at sea. Third, they must be fast; for the speed of the fleet will be the speed of the slowest craft accompanying it. Fourth, they must have facilities for handling and transferring their fuel at sea.

I do not know how many such ships there are under the United States flag at this moment. But somebody ought to know how many there are and how and where they can be reached. This should all be provided for *in advance.* But when it is provided for, it is safe to say that the number will be far short of what a fleet would need. And it is clear that, at the best, such craft could not work at maximum efficiency with a fleet engaged in operations where perfect military co-ordination is of the first importance.

We need, then, in order to make our 37 or our 47 battleships efficient, more large fast Navy fuel-ships of the Jupiter type, many more destroyers, and a considerable number of scout cruisers, designed and built as such, with a speed of not less than 28 knots.

It goes without saying that in these days a scout should carry aeroplanes to be launched from her decks, and this means, of course, that we need a large number of these and of the most efficient type obtainable. It has been suggested that we can rely upon aeroplanes alone, for scouting, sending them out from battleships; and so dispense with cruisers altogether. This might work if no other function were involved than that of locating the enemy; but the screening duty of the outlying line of cruisers is even more important than the scouting duty. To discover an enemy force is helpful, to arrest its advance is far more so,—especially when by arresting it we deny the enemy the information about our whereabouts and our movements which it will be his object to secure.

We are weak in submarines; and the submarine, as you are all aware, has within the last few months established its claim to very serious consideration as an element in naval warfare. It has not shown itself the master of the battleship and I doubt if it will ever do so. But it has taken a more commanding place than most of us have heretofore assigned it. I should rejoice if we had today one hundred submarines instead of less than half that number, built and building. Those that we have are only half efficient because they lack tenders of the proper type to accompany them and care for their needs and the needs of their personnel. Here again crops up the old idea that a vessel for a special purpose demanding special characteristics and vitally necessary to the efficiency of a vital part of our naval force, can be improvised out of any old craft which happens to be handy. And here again is illustrated the false economy which in providing a weapon, efficient within itself, denies it the support outside itself which alone can make it efficient in application.

Running parallel with the omissions in the fleet itself, is a corresponding list of omissions in the provision for its up-keep,—in dry-docks and other navy-yard facilities especially. A fleet without dry-docks of suitable capacity and suitably located is only a little less helpless than one without fuel-ships.

We have at Guantanamo a station which should be the principal base of our fleet for operations in the Caribbean;—the area in which, if anywhere, our control of the Panama Canal will be challenged. But not only have we no dry-dock or efficient repair shops there, we have none within a thousand miles of it. Here the expenditure of two million dollars might conceivably double the efficiency of the fleet in some critical emergency by making it possible for every ship to go out in perfect condition; and it requires no stretch of the imagination to picture the issue of a war as hinging upon this point alone. After a battle, the importance of a dock close at hand for repairing damages is too apparent to require more than a passing mention. It might enable the fleet to take the sea again after a brief delay, with every advantage over an enemy fleet less favorably situated.

It is understood of course that every station which is designed to serve as a base of supply, of repair or of refuge, for the fleet, should be adequately fortified. This is a phase of my subject upon which I should like to dwell at considerable length, but time—and other considerations—make it impracticable for me to do so.

If I have made myself clear up to the present point you will understand by how narrow a margin we have missed efficiency in the composition of our Fleet and the provision for its up-keep, and yet of what vast importance in the space that separates us from it. Two per cent, perhaps,—five per cent certainly,—added to our expenditures year after year, would have added at least fifty per cent to the efficiency of the fleet as a whole.

THE ORGANIZATION OF THE PERSONNEL.

I come now to the question of personnel. In an ideal system, the development here as regards both officers and men would keep pace automatically with the development of the fleet, thro' a law by which the authorization for a certain increase in the number of ships would carry with it the authorization for a corresponding increase in officers and men, and for a reasonable flow of promotion. Failing this ideal, we should at least have a periodical readjustment such as to maintain a personnel ample in numbers, amply trained, and so organized as to insure a flow of promotion which will secure contentment, foster ambition, and bring officers to the command of ships and fleets while still in the perfection of their mental and physical powers. Unfortunately the present conditions are as far from this ideal as could be imagined. To begin with, we have not the officers and men to man our ships efficiently. This is serious enough, but much more serious is the fact that the promotion of officers is so completely blocked that a young man graduating from the Naval Academy must look forward to spending all the best years of his life in the two lowest grades of the service; to performing, as a gray-haired man, the same duties that he has performed as a boy; and to receiving but a very small increase in salary. I need not point out to you the inevitable effect of this upon efficiency.

For this condition I could not place the responsibility if I would. Congress has long been calling upon the Navy Department for a satisfactory personnel bill. Several bills have been prepared and every one has had support. But none has had the cordial support of the Navy as a whole. A new one has been presented to Congress this month. I hope it is a good one but I confess that I do not know.

In this matter, as in that of the fleet, the question of expense stands in the way of every easy solution that can be suggested. Here is the problem in a few words. We need in the three lower grades of the Navy,—Ensign, Junior Lieutenant and Lieutenant,—a very large number of officers. We can find room in the highest grade, that of Rear-Admiral, for very few. Let us say, simply as an illustration and without any attempt of arithmetical accuracy, that of one hundred men who reach the Lieutenant's list, not more than five can ever become Rear-Admirals. Our problem is to eliminate the other ninety-five between these two grades, without injustice to individuals or unreasonable expense to the Government, always remembering that expense is of far less consequence than the efficiency of which it is the price. The interest of the Navy should, naturally, take precedence over the interest of individuals, yet if it appears that a given scheme, in conducing to the efficiency which we all so much desire, chances to conduce also to the advantage of individuals, it should not on that account be abandoned.

The enlisted personnel is inadequate for the manning of the fleet as it exists today, and falls far short of what would be absolutely necessary in time of war. And we have no reserve on which to call. The present shortage is variously estimated at from 5,000 to 18,000 men, the wide difference between these figures being accounted for by different views as to the manning of ships not actually present with the active fleet. The extreme view on one side is that battle-ships can be laid up at a navy-yard for long periods of time with fifty or one hundred men on board and still be counted as serviceable. The extreme view on the other side is that when a ship is to be laid up, approximately half of her crew should remain with her, and she should be kept ready to join the fleet not in a year or a month, but in forty-eight hours. If ships in reserve are to be borne on the Navy list and to stand before the country as available for war, there is no doubt that the second of these views is the correct one. A battleship "in ordinary", as it is called, with less than a hundred men on board, might as well be eliminated from the list of ships available for any service within a reasonable length of time.

Added to the deterioration in the ships themselves after a certain period of the neglect that is inevitable where crews are greatly reduced, is the fact that among the plans for utilizing the ships in an emergency, is one which contemplates manning them with untrained or half-trained reserves. Such reserves may doubtless be made very useful in time of war if they can be distributed throughout the fleet, to be assimilated by the regular crews of active ships. But the fate of the Good Hope and the Monmouth is an object lesson on the folly of manning ships exclusively or even chiefly with reservists.

Here again, I want to call attention to the mistake of providing the largest and finest fighting ships in the world—for this is what our Dreadnaughts are, and it is largely due to the insistence of Congress that they are so,—and balking at the comparatively trifling cost of providing the officers and men to make them fully efficient.

Other factors, less concrete than those that I have named, have militated and are militating against ideal efficiency. All will understand that a fleet cannot be efficient unless it has abundant opportunity for drilling as a unit. No matter how admirable may be the training and the discipline of the individual ships, they will not work together efficiently as a fleet without the team-work which comes from constant drilling in company with each other under the direction of the Commander-in-Chief. And their exercises must be progressive, leading up to war maneuvers on a large scale. We have had too little of this training at all times, and especially within the past year, the necessity of keeping the battleships in Mexican waters having been a controlling factor in all phases of administration of the Navy. This has not made for efficiency, but both the present Commander-in-Chief of the fleet and his immediate predecessor testify that the effect upon efficiency has not been as great as might have been expected. Many of the battleships have missed opportunities for target practice; but here, too, the Commander-in-Chief reports that the effect has not been disastrous. That conditions remain so good in spite of such extremely unfavorable conditions is a gratifying evidence of the excellence of our ships and the fundamental soundness of our personnel. We must, nevertheless, recognize that the necessity for using battleships in this way is seriously detrimental to their efficiency, and this throws further emphasis upon the importance of an all-around development of our fleet with the demands of peace in mind as well as those of war. If cruisers and gunboats had been available for service in Mexican, Haitian and Santo Dominican waters, the battleships could have spent the past year together in a good climate, carrying on their maneuvers and target practice under favorable conditions.

THE ORGANIZATION AND ADMINISTRATION OF THE NAVY DEP'T.

I come now to what is perhaps the most important part of my subject,—the organization of the Navy Department viewed from the standpoint of efficiency. There can be no question that the existing organization is inadequate and would break down under the strain of war. The administration starts from too many sources and flows thro' too many channels. It lacks the unity of purpose which would come from recognition of the fact that a Navy has one excuse for existing, and only one:—that it shall always be ready to strike, on the minute and with every element of power concentrated behind its blow, for the defense of the Country.

Do not misunderstand me. I am not telling you that our organization is wholly bad. I am telling you that it is inadequate. In many cases it works rather surprisingly well. But if you analyze these cases, you will find that insofar as the results are good, they are so in spite of the system and because of some personal factor which has *compelled* efficiency. Moreover, and this is the crux of the whole matter, the cases with which we can deal at the present time are illustrations of *peace* efficiency, whereas the efficiency upon which our attention should be fixed unwaveringly is *war* efficiency;—not because we are going to have war, but because we *may* have it, and because the one supreme duty of the Navy is to be ready for it if it comes.

I suppose this relation of the Navy to war, whether possible war or actual war, has always been understood more or less clearly. But it is a singular fact that the organization of the Navy Department takes no account of it. War is the one thing for which no arrangement is made. There are seven Bureaus in the Department, each with clearly defined duties; but in all the elaborate legislation creating these Bureaus and defining their duties, there is not a word about the duty of keeping the Navy in readiness for war or preparing plans for war, or conducting war after it begins. There would be a certain element of comedy in this if there were not so many elements of possible tragedy. There is a Bureau in the Department charged with the construction and repair of ships, one with the design of machinery, one with the preparation of ordnance, one with the direction of personnel, and so on; but nowhere is it said "This Bureau shall be responsible for the readiness of the fleet for war, for the preparation of war plans and for the conduct of war." This then, is the last and great defect in the efficiency of the Navy. How shall it be remedied? The answer is, I think, by the creation in the Navy Department of a "Division of Strategy and Operations" preferably not co-equal with the present Bureaus but superior to them and standing between them and the Secretary. This arrangement would be a recognition of the fact that all the activities of the present Bureaus should lead up to the Secretary through a channel which coordinates them all and directs them toward war efficiency.

The title proposed for the new office: DIVISION OF STRATEGY AND OPERATIONS, covers very completely the ground that I have in mind. As standing for Strategy this Division would plan what to do; and as standing for Operations, it would direct the execution of its plans. It would correspond more or less closely with the General Staff of the Army and the First Sea Lord of the British Admiralty, whose duties are thus defined:

> 1. Preparation for war: All large questions of naval policy and maritime warfare—to advise. 2. Fighting and sea-going efficiency of the fleet, its organization and mobilization, including complements of ships as affecting total numbers; system of gunnery and torpedo exercises of the fleet, and tactical employment of air-craft, and all military questions connected with the foregoing; distribution and movements of all ships in commission and in reserve. 3. Superintendence of the War Staff and the Hydrographic Department".

These duties are all performed subject to the general authority of the First Lord of the Admiralty, who corresponds to our Secretary of the Navy; and I wish to emphasize the fact that I am not advocating a reorganization which would in any way reduce the authority of the Secretary.

I have spoken of Strategy as shaping plans which are later carried out by Operations. This is a convenient distinction but not an exact one, for in a broad sense, Strategy both plans and executes. It may be defined as the art of so shaping plans and directing forces as to concentrate the maximum of pressure upon the enemy at the time and place best suited to accomplish the purpose at which we aim. This evidently presupposes a clear conception of what the purpose is at which we aim, and a careful preparation,—in advance—of the forces and the plans required for attaining the purpose. The strategy of a far-sighted nation does not begin with the beginning of war. It has its origin far back in the history of international relations and runs parallel with national policies, taking account of the ends at which these national policies aim and accepting their ends as its own.

First of all, then, Strategy is preparation. Secondarily, it is execution; always—if it deserves the name of Strategy—thro' the medium of forces and of plans previously prepared.

I have explained that the defects in the organization of the Navy Department are a lack of co-ordination of authority, as a result of which the administration starts from too many sources and flows thro' too many channels, and a total lack of provision for planning and carrying forward the operations of war. It must not be supposed that these defects have escaped recognition or that no efforts have been made to correct them. The most successful of the efforts to secure co-ordination between the Bureaus was the adoption during the last administration, of a system of Aids to the Secretary, who co-ordinated the work of the various Bureaus and who, when important questions were under consideration, formed a Council upon which he could call for advice. The weak point about this system was, and is, that the Aids have never been legalized by Congress and therefore have no permanent status whatever. In spite of this, they are in a position to do much toward improving the administration of the Department.

The General Board was called into existence in 1900 by an order of the Secretary of the Navy, to provide a body for the consideration of war plans and allied subjects. It has performed, and is performing, work of the very highest importance, but it, like the Council of Aids, lacks legislative sanction, altho' Congress has for many years past shown great interest in its work and not a little deference to its views.

Another and a very important agency to which the Navy Department looks for a contribution to its work in strategy and other matters connected with preparation for war and the conduct of war is the Naval War College at Newport. The War College has been in existence since 1884 and has been an important factor in the education of officers from the very beginning. For some reason, however, it has failed until very recently to command the full recognition which it has deserved from the Navy Department or even from the officers of the Navy. The present Secretary of the Navy visited the College shortly after coming into Office, and, with an insight of which many naval officers have shown themselves incapable, recognized its possibilities for usefulness and pronounced himself its friend. Since that time, he has done everything to forward its work which could be dictated by the most thorough comprehension of its mission and its needs, and as a result of this generous support, both moral and material, the College has taken its proper place as an institution for the training of Officers for high command, and for the development of the art of naval warfare. Thus the College is enabled to contribute something toward making good the lack of a Strategic Division in the Navy Department itself.

You will see, therefore, that altho' no law takes cognizance of the necessity for keeping the Navy ready for war, there are many agencies which co-operate toward that end,—the Council of Aids, to which the Secretary would naturally turn in an emergency; the General Board, and the War College. These agencies are so closely in sympathy that they are able to co-operate harmoniously with each other and with the Fleet, and this co-operation is having important and very valuable results. This does not change the fact that there should be,—that indeed there *must* be—in the Navy Department itself and close to the Secretary, a co-ordinating office to bring the efforts of these and other agencies to an administrative focus bearing directly upon the efficiency for war! Such a co-ordinating office I have already sketched as a Division of Strategy and Operations immediately below the Secretary of the Navy in authority.

The creation of this office would provide a policy for the Navy so far as the activities of the Navy itself are concerned, insuring unity of effort, and shaping plans toward the end which we have recognized tonight as the proper end of all our efforts,—preparedness for war.

But a policy within the navy is not enough. I have said of Strategy that it should take account of national policy as applied to international affairs. We need, then, a policy broader than our naval policy and including it. This must be a national policy, dealing with both Army and Navy and bringing the broadest statemanship as well as the highest technical knowledge to bear upon the whole question of national defense. Its enunciation must come from the highest authority in the land, executive and legislative.

This points to a Council of National Defense, for the creation of which a bill is already before Congress. In such a Council, with the President of the United States at its head, we should have the last word in the co-ordination of national resources for national defense

EFFICIENCY SOCIETY, Inc. PSB-20

Naval Ships (Robinson)

3-8-15

An address before Efficiency Society Annual Meeting, Jan. 25, 1915. by R. H. M. Robinson.

I was a Naval Officer for some 21 years of my life.

My naval experience was along the lines of the design and construction of ships. I was for eight years Assistant to the Chief Constructor of the Navy, in charge of the Design and New Construction Division of the Bureau of Construction and Repair in the Navy Department.

I may therefore claim reasonable familiarity with the genesis, the principles and the details of construction of all the modern ships in the United States Navy.

I had charge of the preparation of the designs of all the present U. S. Dreadnaughts, as my duty in Washington began before the conception of the South Carolina and Michigan and ended in 1913, when I resigned, after completing the design of Battleship No. 39, now building at the Navy Yard in this city.

During this time I saw battleships grow from a displacement of 16,000 tons and a speed of 18 knots, with a battery of eight 12" guns, to a displacement of 32,500 tons and a speed of 21 knots, carrying a battery of twelve 14" guns.

I also had charge of the preparation of the designs of all the modern Destroyers and Auxiliaries and other craft now in active service.

Since leaving the service in 1913 I have been in the business of building submarine boats, which since the activities of the present war in Europe, have become weapons of proved worth, even to the uninitiated, instead of being a vague mystery, known only to a few.

The mission of the British Navy in the present war, to my mind, seems perfectly plain, *i. e.*, to keep the sea open to accomplish the following purposes; first, to insure the supply of food on which the population of the British Isles is dependent; second, to permit industries to continue in operation and so insure the financial stability of Great Britain, and third, to enable Great Britain and her allies, reasonably at will, to transport troops and stores by water from one point to another.

We have but to remember how much this has meant to the Allies up to date.

What probably appeals to the average man is the number of ships that the British have lost up to the present time. This is due to the advanced position the British ships must hold, in order to accomplish their mission and the loss, though serious, is after all but a small proportion of the total number involved.

On the basis that "one cannot make an omelet without breaking the eggs", it is not to be wondered at that they are breaking a few "eggs".

To accomplish the above named purposes one obviously must have several types of ships, heavy and light, fast and slow, surface, under-water and air.

Great Britain has all of these and has used them all.

So far the British cruisers, scouts and destroyers have been most heard of; the only submarine exploits of prominence being those of the E-9 off Heligoland and the torpedoing of the Turkish battleship behind the Dardenelles.

The battleship so far has been prominent only from its ability to sink with astonishing rapidity when it gets a chance.

From this the unthinking may conclude that it is no longer of value.

Although I am now on the other side of the fence, I have not abandoned my first love, in fact, I am a sort of Naval polygamist.

I do, however, believe that the battleship, will, in the next few years, change its type considerably.

I note that in reporting the Naval Bill to the House of Representatives the other day, the Naval Committee said, "while the Committee believes in the effectiveness of submarines and airships, it does not believe that sufficient has been learned from the European War to warrant any change in the battleship program, as has heretofore been authorized".

I think they are right as to numbers; as to types I am not so sure.

I have studied a great deal as to just what the function of the German fleet in the present war should be, and I am not sure that I am qualified to venture an opinion.

The best I can do as to the function of the German fleet, is to quote from General Von Bernhardi's book on "Germany and the next war".

He says, "We have at last come to see that the protection of our commerce and the defense of our shores cannot possibly be the only object of such a fleet, but that it, like the land army, is an instrument for carrying out the political ends of the State and supporting its justifiable ambitions.

There can be no question of such limited objects as protection of commerce and passive coast defense. A few cruisers are enough to protect commerce in times of peace; but in war the only way to safeguard it, is to defeat, and where possible, destroy the hostile fleet. A direct protection of all trade lines is obviously impossible. Commerce can only be protected indirectly by the defeat of the enemy. A passive defense of the coast can never count on permanent success."

"The object of our fleet therefore, is to defeat our possible rivals at sea, and force them to make terms, in order to guarantee unimpeded commerce in our merchantman and protect our colonies."

He further says:—"Let us imagine the endless misery which a protracted stoppage or definite destruction of our oversea trade would bring upon the whole nation, and in particular, on the masses of industrial classes who live on our export trade. This consideration by itself shows the absolute necessity of strengthening our naval forces in combination with our coast defense so thoroughly that we can look forward to the decisive campaign with equanimity".

In the German service as well as the British, the battleship has so far made itself little felt, and the scouts, fast cruisers, destroyers and above all the submarine, have kept the center of the stage.

The action of the German submarine has been extremely efficient and most important, but, after all, the loss to the British of the ships so far sunk, should have very little effect on the general situation, unless it so seriously impairs the morale of the British fleet, or so affects public opinion as to force Admiral Jellico or his successor, to forget their real mission and try to do as Mr. Winston Churchill threatened "dig the Germans out", easier said than done.

Modern warships in all navies of to-day, are divided into, submarines, torpedo boats, destroyers, scouts, gunboats, cruisers, battleships and armored cruisers or battle cruisers.

There are, of course, attached to each fleet numerous auxiliaries, such as colliers, oilers, repair ships, hospital ships, supply ships, tenders, etc., which in appearance and in engineering features are of the merchant type rather than of the naval type, since their primary function is the supplying of stores or mechanical aid to the fleet and not to fight.

Anyone of these types might furnish a subject for a much longer talk than I am permitted to give you on all of them together, so you may well imagine that my description will be of the sketchiest.

The United States Navy ranks third to-day in the order of importance in the navies of the World, at least so far as material is concerned. I think I am safe in saying that its personnel is at least equal to its material.

Prior to the present war in Europe, the German Navy was rapidly assuming an easy second place and the British Navy, is, and always has been, first by a large margin.

I have named the ships in the order of their size, beginning with the smallest.

As I am inclined to think however, that their potency does not in all cases vary directly as to size, I will begin my description with the biggest, which, incidentally, will leave me more time later for the exploitation of my own wares, the smallest of them all, the submarine.

The two types supposed to form the backbone of the fleet and dubbed "Capital Ships" or "Ships of the Line," are the armored or battle cruiser and the battleship.

Mr. Ruskin says "A ship of the line is the most honorable thing that man as a gregarious animal has ever produced." I don't suppose that Mr. Ruskin really knew any more about a battleship than Mr. Edison does about cigarette smoking, on which he has some strong opinions. However, as I have "produced" several battleships in my time, I have a pardonable partiality for this resonant literary phrase. Incidentally, I have smoked several cigarettes, but I'll spare you Mr. Edison's idea of a cigarette smoker.

Formerly, we and other nations, had, in addition to battleships, several odd types of capital ships, such as monitors, floating batteries, etc., but all capital ships have finally come to the two types, *i. e.*, battleships and battle cruisers.

In their present forms, the two types are difficult to distinguish from one another, the differences being those of speed and armor. The battleship has more armor and less speed than the battle cruiser and generally a few more guns.

In earlier days, not so many years ago, armored cruisers which were the forerunner of the battle cruiser, had lighter guns. Our "Pennsylvania" class has 8″ and 6″, and the "Tennessee" class 10″ and 6″. In those days the battery of a battleship was 12″ and 6″, or 12″, 8″ and 6″.

One has but to consider the fact of the fate of the "Good Hope" and the balance of the gallant squadron of Admiral Craddock in their fight against the "Scharnhorst" and "Gneisnau" with their uniform battery and heavier calibre guns, and the subsequent equally gallant, but equally hopeless fight of these same German ships against the modern battle cruisers with 12″ guns, to appreciate the absurdity of the armament of the early armored cruisers, neither fish, flesh or fowl.

To-day no battleship is built with major battery guns of less calibre than 12″. These are generally eight to twelve in number, or there is an equal number of 13½″, 14″ or 15″; the British use 13½″ and 15″ and we use 14″ with the probability of going to 16″.

Modern battle cruisers have the same calibre guns as the battleship, but usually only eight in number, as against the battleship's ten to twelve.

Their armor is somewhat thinner than the battleship and their speed from seven to ten knots greater.

We have no such battle cruisers though several projects have been advanced to build them.

The construction of a battleship is a matter of many months time and the battleship and the submarine present two samples of work that combine more different applications of the various branches of engineering than anything I can think of.

The hull of a battleship is built of mild steel. The frame work consists of a number of longitudinals running from end to end, and a number of transverse frames standing at right angles to the longitudinal center line. These longitudinals and frames are built up of plates and shapes.

A watertight bottom is fitted on the outside and also on the inside of this framing and decks or floors are worked at various levels.

The ship is divided into a number of compartments by bulkheads or partitions running transversely and longitudinally.

Great care is taken with the work to make it watertight and each compartment is tested by being filled with water to a considerable height above the waterline to insure that it is watertight.

The decks are named as follows: the upper continuous deck is called the main deck; a partial deck above this is called the forecastle—upper or poop, according as it is forward, amidship or aft. The complete decks below the main deck are called, second, third, fourth, etc. Partial decks below the lowest complete deck are called, first platform, second platform, etc.

Decks fitted with protective plating are called protective or splinter decks.

In a typical modern case the normal waterline is 28′ 6″ above keel and the main deck height above waterline is 18′ 6″, with forecastle about 8′ above that.

Taking the "Nevada" and "Oklahoma," the latest battleships launched, and whose design was prepared about a year before I left the Service, we find the:

Length is	—	575 feet
Breadth	—	95 feet, 2½ inches
Displacement	—	27,500 tons
Horsepower	—	26,500
Oil	—	2,000
Speed	—	20½ to 21 knots

The side armor is 13½″ thick and extends from about eighty feet abaft the bow to about 24 feet from the stern. It is about 18½ feet wide, of which 8′ 6″ are below water and 10 feet above.

The armor is fastened up against the side of the ship by bolts having nuts inside the ship. Between the armor and the ship is a thin layer of wood sufficient only to take up the unequalities of the inner surface of the armor plates. The butts of armor plates are keyed, but otherwise there is no connection between adjacent plates.

The armor belt at the ends is joined by transverse bulkheads across the ship, forming a rectangular box. The top of the armored part is formed by a thick deck from 3″ to 4½″ thick.

Heavy armor projections rise above this to protect the funnel bases and the turret supports, but barring that, the part above this thick deck is soft and may easily be destroyed by projectiles, but even if completely destroyed the safety of the ship is not thereby endangered.

Under water the ship's external hull is not armored.

Several propositions have been advanced as to protecting the under water part of the hull against torpedo damage.

A favorite proposition is underwater armor. You may take it from me that such a proposition of underwater armor at least externally applied, is absolutely futile. Underwater armor as a torpedo protection, at least armor applied as is the above water armor, if of no use. I have tried it and know.

I worked over this torpedo protection question for many years, and we finally evolved the principles on which I believe, the best protection possible may be obtained. I have reason to believe that this system of protection is

better than any foreign service has, but even it, while it will ultimately save the ship is far from making the ship immune to damage. In fact, I doubt very much if a ship can be made immune.

We experimented many years and spent many thousands of dollars at it, while I was in the service and Admiral Knight and I were jointly bothered with the question.

The battery on the Nevada is:

10—14″ guns in 4 turrets, two triple and two double.
21— 5″ guns
4— 3 pdr. saluting
2— 3″ field
4—21″ submerged torpedo tubes

The turrets are built of structural materials, outside of which is armor. They revolve on a live ring of conical rollers on top of a steel track supported on a stool. The revolving movement is furnished by electric motors, as is the power for elevating the guns, hoisting the shell (which weighs 860 lbs., for the 12″ and 1400 lbs., for the 14″), and in some ships for opening the breech blocks of the turret guns.

Considerable delicacy of control of the turret is necessary to permit the gun being kept on the target when the ship has a complicated rolling and pitching motion.

The centerline arrangement of turrets gives the maximum number of guns on broadside, and as this is the bearing on which the guns are most needed, and the oftenest, this arrangement has many advantages. The arrangement shown on the "Michigan" and succeeding ships, called the "Vertical Echelon Arrangement" gives the maximum broadside fire without adversely affecting end on fire; it is original with us, but is now used in all the capital ships of all the nations.

The "Nevada" is the first ship in our service with triple turrets. Succeeding U. S. battleships have all triple turrets.

A battleship is commanded by a Post Captain or Full Captain, as distinguished from a commander whose customary address is, or at least has been in the past, Captain. Incidentally, any officer in actual command of a ship, is, while so serving, entitled to the title of Captain, irrespective of his actual rank.

Battleships carry from 900 to 1200 men, of all ranks and rates and the loss of such a ship is a serious matter, in the loss of life involved and in the property loss.

The battle cruiser is a type unknown in the service of the United States. The British, German and Japanese service have this type of ship, whose origin is English. They are characterized as I told you before, by their speed, which is from 27 to 31 knots, and by a battery of the heaviest calibre guns, 12″ to 15″ and by some lesser armor thickness than obtains in the battleship.

It has been a matter of some discussion in Naval circles as to their function and the opinion as to the wisdom of sacrificing guns and armor to speed has been divided.

Personally, I was formerly a protagonist of the slow and heavy—to-day I see the necessity of the light and quick.

Cruisers of the unprotected type in the U. S. service are few and old, where the desire to increase the strength of the battleship fleet and the smallness of our merchant marine has led us to give up building cruisers, until to-day our relative cruiser strength is far too small.

The U. S. Service has built no cruisers since the "St. Louis" class of twelve years or more ago, which were:

Length — 424 feet
Breadth — 66 feet
Depth — 22 ft. 6 in.
Displacement — 9,700 tons
Speed — 22 knots

They have relatively light batteries, generally 6", little or no side armor and a protective deck.

They are supposed to be the Frigates of the present day fleet, protecting commerce routes, scouting, convoying and for expeditionary work. Perhaps the fact that we have very little over-sea commerce under the U. S. flag, makes this type of less value to us than to other nations. The "Olympia," flagship of Admiral Dewey at Manila Bay is a cruiser of fairly large size. A reasonably representative type is the "New Orleans."

A Gunboat is a small unprotected cruiser usually used for showing the flag and protecting national interests in out-of-the-way places; for the United States, Mexico and Central America were fruitful fields before the days of "watchful waiting."

To this class may be said to belong the "Paducah." The "Paducah's" dimensions are:

Length — 174 feet
Breadth — 35 feet
Depth — 12 ft. 3 in.
Displacement — 1,085 tons

The ships of the "Paducah" class do not present any peculiarities which are worthy of note, except possibly their surpassing ugliness.

Gunboats have speeds varying by types, of from 14 to 20 knots, and an armament of 4" to 6" guns.

Ships of the "Paducah" class are built of steel frames with steel upper works and wood planking below water, which permits copper to be used for anti-fouling purposes, and so allows a vessel of this type to remain without docking for a long period.

A *Scout* is a high speed cruiser of light construction to permit a great weight to be given to propelling machinery. They are used by an Admiral for keeping in touch with the enemy's movements.

They are wholly unprotected, or such protection as is fitted, is confined to a protective deck, *i. e.*, a deck 1" or 2" thick, just above the water-line over the boilers and engines, and usually with crowned sides below the water-line, and in some cases to a thin belt 2" to 2½" for protection against shells from an enemy's destroyer.

A scout is not meant to stand and fight any kind of a heavy ship, but should not be driven off by a screen of destroyers and hence is fitted with a heavier battery than destroyers, generally of 5" or 6" guns, and also carries torpedoes fired from under-water tubes.

The present war has shown the value of this type, although their service, so far, has usually been other than that which their name might imply.

Such vessels are usually turbine driven, with small tube boilers and in many respects are simply large destroyers. We have in our service, only three, the Chester, Birmingham and Salem, having respectively, Parsons Turbine, reciprocating engines and Curtis turbines.

Their speed is 25 to 28 knots; the dimensions of the "Chester" class are:

Length — 420 feet
Breadth — 47 ft. 1 in.
Depth — 16 ft. 9 in.
Displacement — 3,750 tons

These ships in our service are usually commanded by a Commander and have a crew of about 350 men.

The term "Torpedo Boat Destroyer" is applied to a large torpedo boat, and it really differs only from the earlier and smaller torpedo boats in its size, speed, armament and ability to keep the seas in heavy weather.

As a matter of fact, few, if any, countries now build torpedo boats, so that the Torpedo Boat Destroyers have no torpedo boats to destroy, and are used in place of the old torpedo boats, but as they are large and seaworthy and capable of accompanying the fleet, their usefulness is much increased.

A modern Destroyer is a very lightly built, high speed boat, at from 750 to 1200 tons displacement. They are quite without armor or protection and depend on their speed, mobility and small size for their safety, but even then must run great risks.

The latest destroyers we have in our service are:

Length — 300 ft.
Breadth — 30 ft. 5 in.
Depth — 19 ft. 3 in.
Displacement — 1,010 tons
Speed — 28 to 30 knots

These are generally turbine driven, (we have in the U. S. service three types, Parsons, Curtis and Zoelly), with small tube boilers, and our latest types, burn only fuel oil.

These latest boats carry an armament of five 4" guns, and three double torpedo tubes, mounted on the deck like a gun, which fire automobile torpedos of the Whitehead type, whose ranges is from 4,000 to 10,000 yards.

They generally are commanded by a Lieutenant or Lieutenant Commander; with a complement of some 90 to 100 men.

They operate in divisions of four, and with the exception of the submarine service, represent for the younger officers, the most interesting phase of active service afloat.

There is no essential difference between modern destroyers of the different nations, all being nearly of the same size, speed, and armament, and wholly without protection in the shape of armor.

I have inspected on their native heath, English, French, German and Russian destroyers and have designed some fifty odd myself.

Submarines.

The submarine is not a new conception. In fact, it is a very old one, and various submarine projects have been advanced beginning long before the Christian Era; probably about Jonah's time. The patentees have included clergymen, merchants, undertakers, lawyers and a few engineers.

The submarine did not become a really workable and practicable proposition until the internal combustion engine became a practicable source of power, although strangely enough there is a tendency to return to steam as a means of propulsion in some types.

Modern U. S. submarines now in service, vary in size from a length of 64 feet and a displacement of 122 tons with a submerged speed of 6 to 8 knots, and a surface speed of 10 to 12 knots, to a length of 165 feet and a displacement of 520 tons, with a submerged speed of 10½ knots and a surface speed of 14 knots.

Some foreign submarines are even larger and faster, and the U. S. Navy has just contracted for a submarine of over a thousand tons displacement and a surface speed of 20 knots.

Modern submarines are of two general types—submarines proper, and submersibles. The first is a ship of small submerged buoyancy on the surface, *i. e.,* when running on the surface there is very little of the boat exposed; the second has considerable reserve buoyancy, from 20% to 40%, and in this respect when on the surface resembles closely an ordinary ship or torpedo boat and hence is much more comfortable for long trips.

The modern submarine depends for surface propulsion on some form of internal combustion engine; the earlier boats had gasoline engines and the later, heavy oil engines.

For submerged propulsion they depend on electric motors, run by a storage battery, and of course, the distance they can run on such batteries is limited.

Submerged the radius usually varies from 25 to 75 miles, depending on the speed and type, but on the surface goes as high as five thousand or more miles.

A submarine can, of course, remain submerged at rest, if desired, so that the length of time she can stay under water is not necessarily governed by the submerged radius.

These motors can be run as generators for charging the storage batteries when on the surface.

The vessel to submerge closes the hatches, stops the engines, admits water into tanks in the interior of the boat, until the buoyancy is nearly destroyed, and then by starting the motors from the storage battery, and inclining the diving or horizontal rudders and hydroplanes, the boat can take the depth desired.

Submarines under way always operate with a small amount of positive buoyancy, giving a natural tendency to come up unless held down unnaturally.

The boat, of course, contains complicated apparatus of various kinds, for handling, controlling and recording the performances of the boat, which I will not attempt to describe.

The weapon of the submarine is the automobile torpedo, operated by compressed air, usually fired from the interior of the boat, though in some types of submarines, launching tubes on frames are also carried externally. Several launching tubes, either external or internal, are carried on each boat, with spare torpedoes for each tube. Later types of submarines carry one or more guns, but these are purely for protecting the boat from air craft or other boats when on the surface and are not primarily for offense.

To free the tanks of water in the boat at any time, compressed air is carried, by which the water can be blown overboard.

The air storage cylinders may be recharged at will when on the surface, by an air compressor carried in the boat.

The Commanding Officer of the boat keeps an eye on the enemy when running near the surface, through the periscope, an optical instrument, with the eye-piece in the boat and the object glass some distance above the hull of the boat, the reflection being through lenses and prisms.

These vessels are in our service commanded by one of the younger officers, generally an Ensign or Lieutenant; have 18 to 20 men in the crew, usually petty officers, and the service is arduous but interesting.

Such boats generally operate with a mother boat or tender, *i. e.,* a surface ship carrying stores, charging machinery for batteries, repair machinery and sleeping quarters for the crew when off duty, as, except in the larger boats, living on board is not attempted in times of peace, except for fairly short periods or in emergencies.

In an article in the London Times of June 5th, this year, Admiral Sir Percy Scott of the Royal Navy, who had been most noted for his contribution to the efficiency of modern gunnery and other features of the battleship, prophesied the doom of the battleship.

Coming as it did from an officer of his standing, it created a profound sensation, but nowhere made so great or lasting a sensation as have the operations of submarines since the war began.

The performances of submarines in the war, up to date, have been no surprise to the submarine man, unless it be that they have not done more, particularly the British boats.

I am not one who predicts for a minute the disappearance of surface war ships. In fact, I should not advocate it, if I did believe in it, as then my product would have nothing to attack, but knowing as I do that the submarine presents to an Admiral in command of a blockading or holding fleet, a problem to which there is no answer, I do feel that the capital ships will change in type and shrink in size and cost from its present stupendous position.

All I wish to say now, is that Santiago and Port Arthur can never be repeated and if the giant battleship had voice, I am sure it would say as did the Gladiators, *"Nos Morituri te Salutemus."*

Some of these days, not very far off, I am going to formulate my ideas of the coming capital ship. Probably it won't have much effect, but it will be amusing to see how close I can guess.

At present, in the words of the twentieth century poet, the Naval Chanty has become "Get out and Get Under," and I can assure you that "Everybody's doing it now."

Efficiency and South American Trade (Kies) 10-16-15

Address of W. S. Kies, vice-president of the National City Bank of New York, before the Advertising Men's League of New York City, Friday, October 8, 1915. Reproduced by permission.

The subject of foreign trade expansion has fixed the attention of the business interests of this country since the beginning of the European war, and the American manufacturer, during the past year, has been quite intently studying the possibilities of foreign trade. In this study, he has discovered a number of fundamental facts. He has learned that the development of a satisfactory export business is a long and difficult process; that in order to enter foreign fields successfully, he must have a knowledge of the characteristics and customs of the people with whom he seeks to trade. He has come to a realization of the fact that his viewpoint hitherto has been, to a large degree, provincial, and that if he is to become a successful international business man he must broaden out and obtain an international point of view. He has learned that to do foreign business successfully requires the services of men trained especially for the work, men who are tactful and diplomatic, capable of obtaining not merely one order but of establishing permanent business relations. He has discovered that he must learn to pack his goods so as to make them carry the least possible freight rate, pay the smallest customs imports, and withstand safely the particularly rough handling to which packages are submitted. He has realized that the demands of foreign markets must be considered, and that if he would be successful he must make his goods to meet the requirements of his foreign customers, and not try to compel them to take something which they do not want.

Study and Effort Needed.

There has been impressed upon the hitherto indifferent business man the necessity of developing in this country a merchant marine, and the advantages which might accrue to the country by being able to carry American goods in American bottoms. A study of the prices which foreign competitors are able to make has stimulated an examination of costs of production at home, and emphasized the necessity of the introduction of greater efficiency methods in production. The survey of the foreign field has shown, too, that broader ideas in regard to credits must prevail; that in fixing terms of payment local conditions must be known and appreciated; that long credits in many foreign countries are not, in all cases, the result of unsystematic methods or bad business habits, but due often to the difficulties of distribution and the lack of communication in undeveloped countries. In short, a superficial glance at the export field indicates that a successful cultivation of it will necessitate careful, scientific preliminary study, close application and energetic, consistent effort.

Difficulties in Competition.

The maintenance of existing markets and the development of new markets depend primarily upon one fundamental fact: Is the manufacturer able to compete on equal terms? Competition is of two kinds, in quality and in price. It is undoubtedly true that as to quality, in most lines, the American manufacturer is able to hold his own in any market, but the price at which an article can be sold always depends upon the cost of its production. There are three elements entering into the cost of every article: fixed charges on capital invested, raw material, and labor; and in most instances the labor cost represents the largest percentage.

The living standards of the American laborer are the highest in the world, and his wages have been such as to permit him to maintain these standards. No one desires to see them lowered, but, on the other hand, they cannot be inordinately raised to the point where production costs will be so increased as to make competition with the manufacturers of other nations impossible.

We have been able in many lines, where wages were much higher in this country, to compete in foreign markets because of the ingenuity of our mechanics and the greater efficiency of the American laborer. We have been able to hold our domestic markets because of these facts, and because, for many years, this country has had a protective tariff. But we have no monopoly upon machinery, and other nations, where they could not imitate, have purchased the use of our patents. Just prior to the outbreak of the war a low tariff policy had been inaugurated, and the effects were beginning to be apparent when the war broke out. Many manufacturing establishments had been running on half time and others were closed, while in some industries plans had been made to establish factories in other countries, owing to the impossiblity of competition due to the difference in the cost of labor. In most instances the competition most feared was that of Germany. The abnormal conditions brought on by the war have enabled many of these concerns, temporarily, to prosper. The significant thing, however, is that wages have been increased in many of these lines. What will become of these industries after the war? It is reasonable to assume that production in Europe for some period after the war closes will proceed at a disadvantage, and at an actually higher cost. If it were possible to maintain wages in this country at anywhere near the former level, the margin which has kept us out of many of the markets of the world heretofore would be changed in our favor.

The nations of Europe, when this bloody nightmare shall have been dissipated, will be compelled to pay an enormous bill. Every man, woman and child will be compelled to produce. These products will be offered for sale in the markets of the world in order to restore shattered credits. Production will go on at a disadvantage, and at a greater cost than hitherto, but these products will be sold at any price because their sale will be a necessity. The most rigid economy will prevail and standards of living reduced to the minimum. Not only the foreign markets which we now have, but our domestic markets will be in danger. Realizing the competition in store for us, ought we not to begin immediately to prepare for this commercial warfare?

Prosperity Contingent Upon Manufacturing.

Our national prosperity is contingent upon the prosperity of our manufacturing industries. In the last few decades we have become more and more a manufacturing nation. We are great agriculturally, but the demands of our increasing population are fast depleting our exportable products of the soil, and the growth of our wealth as measured by the excess of exports over imports will depend more and more in the future upon the progress of our manufacturing establishments.

Within the last twenty-five years billions of dollars have been invested in factories and workshops, and the percentage of manufactured articles among our exports has been increased yearly, while our exports of food products, in normal years, have been decreasing. For the fiscal year 1914, which ended just before the beginning of the war, and would, therefore, be considered as normal; of the total of our exports, 18% was of food stuffs, as against 44% in 1894, whereas manufactured products formed 47% of our exports, as against 23% in 1894. The value of the products of our factories increased 81% from 1900 to 1910, and the number of persons employed in the United States in manufacturing and mechanical pursuits increased 90% in the period 1890 to 1910, while the number of persons engaged in agriculture increased but 37% in the same period. These increases indicate to what extent our prosperity is dependent upon our manufacturing interests, the necessity of obtaining new outlets for our increasing products, and the importance of maintaining our hold upon existing markets. It is only in comparatively recent years that we have turned our attention seriously to foreign trade. Our domestic market is the largest market in the world, and our manufacturers, with remarkable skill and energy, have intensively developed it, with splendid results. In spite of our unscientific methods in the development of foreign markets, the growth of our foreign trade presents a cheering picture.

Exports of domestic merchandise from the United States to foreign countries have grown from $376,616,000 in 1870 to $2,428,506,000 in 1913. The increase in the exportation of manufactured articles alone grew from $485,021,000 in 1900 to $1,020,417,000 in 1912, a gain of 110 per cent. Germany, during the same period, increased her exports of manufactured articles from $745,000,000 to $1,430,142,000, or but 102 per cent. From 1870 to 1913 the population of Germany increased from 41,000,000 to 67,500,000, a gain of 64.6 per cent., while the population of the United States increased, during the same period, from 48,558,000 to 97,028,000, or 151 per cent.

Considering the size of our country, its almost inexhaustible resources, and its growth in wealth and population, the growth of our foreign commerce, while encouraging, is not impressive. This country has greater productive resources than any other nation in the world. We have, with few exceptions, the raw materials to supply our manufacturing industries. Nature has given us innumerable water powers and an almost inexhaustible supply of coal. We have iron, stone, lumber and other construction materials in abundance with which to build factories and workshops. Add to our natural resources a plentiful supply of intelligent labor, and we have all the essential elements which should make us the greatest commercial nation of all times.

Fundamentals in Failure to Develop Foreign Commerce.

Our failure to develop our foreign commerce more rapidly in the past is due to certain fundamental difficulties which have hampered its growth. Our progress in the future will depend upon our ability to overcome these same difficulties. One fact stands out quite clearly, and that is that, as a nation, we have not heretofore seemed to appreciate the great importance of a large foreign commerce to the permanent prosperity of our country.

The American manufacturer is known for his aggressiveness in domestic commerce. He is willing to spend any amount of time and effort in opening up new domestic markets without figuring upon immediate returns. He looks to the future and is willing to devote ample time to foundation laying. But quite generally he is a changed man when the foreign field is considered. In the past many of our manufacturers have not been willing to do the preliminary work necessary in opening a foreign market. Too often the foreign market has been considered a dumping ground in times of over-production, and when the manufacturer was again able to dispose of his products in this country he had no further interest in foreign business. It is needless to say that this policy will not result in developing a permanent foreign trade of satisfactory proportions. But the American manufacturer is often short-sighted in other respects. The National City Bank's commercial representative in Buenos Aires, in a letter recently received, says:

> The American manufacturer has not yet awakened to his opportunity, and seems to be backward in taking advantage of the situation. He does not realize that he has the chance to build a permanent market, and that if he is to do so he must attempt to cultivate his future customers. He must not be unwilling to grant terms or make concessions for future business. Cash in New York is the usual demand, and is being obtained solely on account of the fact that Argentine today is unable to buy elsewhere. He has raised his prices, and the Argentine merchant complains bitterly that the prices which he is compelled to pay are exorbitant, and far above the scale determined by supply and demand. The Argentine's present experience with American business and American business methods is not putting him in a favorable frame of mind toward the continuation of business with our country. From present indications, it would seem that at the conclusion of the war the Argentine will be more prejudiced against American goods than he was before, and that the golden opportunity will be lost beyond recall.

In an editorial in *La Nacion*, one of the leading papers in the Argentine, on the subject of North American commercial policy, appears the following:

> As long as the abnormal conditions in Europe continue, Americans will go on occupying the position which fate has forced the countries at war to abandon. This fortunate situation of North American commerce will be, however, only transitory, if the Americans do not strive to strengthen their position by procedure that will enable them to confront the attack that is sure to come. North Americans find themselves in the unusual position of determining conditions arbitrarily without competition, and these abnormal circumstances should lead them to adopt commercial measures tending to give them permanent possession of the position acquired through the favoring circumstances of the European war. The situation will not be tenable unless they modify their methods. They must model them after those of European countries, offering the same advantages and facilities, and adapting themselves to the demands and peculiarities of the market which they supply. They must establish for themselves a natural and healthy course of relations which will give them the position of preference or, at least, will not subject them to a precarious position of inferiority. This is the moment to introduce methods which will perpetuate markets occupied by force of circumstances, for by failure to do so these will be irretrievably lost, and the American business will be reduced to a point that is scarcely perceptible.

Our Methods Criticised.

Are these complaints justified by facts? From numerous instances which have come to my attention, it would appear that, in all frankness, we must admit that our methods in foreign commerce are open to criticism. Only a day or so ago I received a letter from Buenos Aires telling of the unfortunate experience of an Argentine commission man importing potatoes from Spain. The Argentine had been told that the American potato was superior to the Spanish potato, and arrangements were made for the importation of several thousand crates. The arrival of the first American potatoes in the Argentine was well advertised, and a large number of commission men were at the dock to get a look at the American potatoes. The men who shipped these potatoes had demanded and obtained cash in payment in New York in advance of the shipment. When the potatoes were landed, and the crates opened, it was found that the shippers had sent potatoes of a most inferior quality. They were small, many rotten, and not even usable as seed potatoes. Fortunately, by the next steamer two other lots arrived, shipped by different commission houses, and they were fine samples of the American potato, and easily superior in looks and quality to the Spanish potato. The action of the North American commission house which shipped the first lot has been the subject of highly unfavorable comment among all the importers in Buenos Aires. I could give you a number of other instances of a similar nature, where the present necessities of South Americans were taken advantage of to exact cash in New York in payment for inferior goods which were shipped. It is needless to say that instances of this kind do not help in building up export trade.

Credits the Stumbling Block.

One of the main difficulties in the doing of business in foreign countries, which has assumed large proportions in the eyes of the average manufacturer in this country, is the question of foreign credits. The business man who has been perfectly willing to grant ninety days', or even six months', credit to this country, hesitates to take the risk when his goods are to be shipped across the water. To the average merchant, accustomed to twenty-four hour trains between New York and St. Louis and five day boats between New York and Liverpool, the twenty-five days by steamer from New York to Buenos Aires is rather discouraging. We are accustomed to doing business rapidly in this country. In the ordinary course of events, it often takes two months for a letter to go to, and its reply to come from, the Argentine. Considering the difficulties of communication, the attitude of the exporter in desiring to be thoroughly informed as to the credit of his purchaser in South America is entirely justifiable.

If, however, we desire to trade with South America, this question must be fairly considered, and reasonable credit terms extended where the risk is reasonably safe. The collecting of credit information in Latin-American countries is difficult. It is usually not the custom for a merchant to give a statement. The gathering of credit information, is, in reality, a diplomatic task.

The large mercantile agencies of this country have been operating in South America for some time, and have acquired a great deal of very valuable information. Their services, of course, are at the command of the American exporters. But business men of this country have been accustomed to receiving, in addition to the reports of the mercantile agencies, the opinion and judgment of banks upon prospective risks. The credit departments of the large banks of this country supplement in a most valuable manner the work of the mercantile agencies. Through sources of their own and through information received from other banks as a result of an admirable spirit of co-operation, the banks are enabled to give to the American business man, in most instances, reliable and accurate information upon the standing of merchants in this country.

In foreign countries, and in South America in particular, in cases where a bank's judgment upon the credit standing of an individual would be of most value, our merchants have heretofore been handicapped by the lack of American banks. The passage of the Federal Reserve Act made it possible for national banks in this country to establish branches in foreign countries. Probably the most important service which can be rendered by these banks, aside from the development of an active exchange market for the American dollar, will be the building up of credit bureaus which can be relied upon by commercial interests in this country. The first branch of an American bank to be established in a foreign country was opened on November 10, 1914, in Buenos Aires. Since then branches have been opened at Rio de Janeiro, Santos, and Sao Paulo, in Brazil; at Montevideo, in Uruguay; and at Havana, in Cuba.

Credit Difficulties in South America.

The task of collecting credit information is made more difficult by reason of fundamental conditions in South America. Because South America is a producer of raw materials and not a manufacturer of goods, trade is profitable and attractive, and there has been vigorous competition among European nations for it.

England, Germany, Spain and Italy have for years maintained large banking institutions, particularly in Brazil, Argentine and Chile. These banks have been active agencies in the promotion of trade. Naturally there has been keen rivalry between them, and little co-operation. The banks, as a rule, do not exchange credit information with each other, and it is not at all a strange thing for a man entitled to a line of $80,000 to have credit extended to that amount in three or four banks at the same time.

Each bank feels that it has learned by experience, and that the other fellow ought to pay the price in the same school. In considering South American credit conditions, the lack of co-operation between banks, and the natural tendency to over extend credits, must not be lost sight of. In this country, as you know, banks willingly exchange credit information, and it is almost inconceivable for a man to obtain an excessive line of credit, even though he scatters his accounts and does business with a number of banks.

In forming a judgment as to the credit of a South American firm, therefore, the standing of the firm must, of necessity, be a large factor. It is entirely possible that, as a result of the introduction of American banking methods, Latin-American business men may be induced to see the advantage of giving to the banks a statement of their business, and it is to be hoped, too, that some closer co-operation may be brought about among the banks. The change in methods, if it comes, will be a slow process, and, in the meantime, the credit department of a branch bank will be obliged to bend its efforts toward obtaining a history of the business concern under investigation, and as much information as possible in regard to its standing in the business community.

There are, however, means of supplementing this information at hand in this country. A great many firms have done business in South America, and, if they are willing to send their credit experience with South American firms to a central clearing house, this information, coupled with what is obtained in South America, ought to enable the formation of a fairly reliable opinion as to a man's business integrity.

If you had information that a man had been in business for twenty years, that he stands well among his business associates, that his house appears to be progressive, that he has never failed, that he always accepts his drafts promptly and pays them when due, and that he has dealt with some ten or twelve American firms over a period of eight or ten years, and always paid them promptly, you would probably not hesitate in extending that man credit, even though he should want six months' time, particularly if you were paid for the credit in the price you received for your goods.

Co-operation Necessary for Credit Betterment.

Information of this kind can be at the disposal of American business men in a short time if the right degree of co-operation can be brought about between the National City Bank and those interested in foreign trade. At the present time the bank is keeping a record of the payment of every South American draft. If there is any delay in acceptance, we try to find out why. This information is placed in the credit files. We are receiving by each steamer data and information concerning the standing of local firms. We ask that the business houses in this country, dealing with South America, send to us their experience with South American firms. It will be treated as confidential, and will be used only for the purpose of enabling us to form an intelligent opinion as to business standing in South America. A great many firms have volunteered information of this kind. The more ready the response to this suggestion, the more effective will be the credit service which is being developed.

South American Business Characteristics.

A word in general as to the character of South American merchants might not be out of place. The experience of hundreds of business firms, as related to me, indicates that the average South American has just as high a sense of business honor as the merchants of any other country in the world. The percentage of losses, due to bad debts, suffered by those who have operated successfully in South American markets, is in many instances considerably less than here in domestic markets.

The South American business man is a courteous gentleman, and a loyal customer, and when once his confidence is obtained it is hard for a competitor to win him away. But the suspicious attitude of the South American toward North American efforts to win his commercial friendship is not entirely to be wondered at, when instances, such as the inferior potatoes shipped to Argentine, are of frequent occurrence. We may rest assured that every example of sharp practice or tricky dealing on our part is well advertised, and the development of a permanent export business is, through such acts, seriously hindered. It is only fair to say that the most of our mistakes arise from our ignorance. We have been so busy in this country with our internal development that we have never attained a really international point of view. Great as we have grown, we are nevertheless provincial. From early school days we have been taught that this is the greatest country in the world. We have little knowledge of the habits, customs and characteristics of other peoples, of the resources of their countries, and of their possibilities of development. We have been quite self-sufficient in our business methods. We believe we manufacture the best goods in the world, and, in the past, we have too often paid little attention to the demands of foreign markets, but have sought to impress our ideas upon the foreign purchaser. We have given the impression that we know more about what they ought to have than they know themselves. We have ignored their demands and have failed to follow directions given with orders.

Pertinent Facts; South American Resources.

Our national ignorance concerning South American countries in particular is to be criticised. How many of you, for example, know that the total annual commerce of Argentine is about equal to that of Canada, and larger than that of China, of Australia, and of Japan; that the *per capita* commerce is nearly two and one-half times that of the United States, and that the *per capita* commerce of little Uruguay is about double that of this country? That Buenos Aires is the fourth largest city on the continent, as modern and up-to-date as any city in the United States, and has the most finely equipped newspaper office in the world? As evidence of its up-to-dateness, it might be mentioned that Buenos Aires receives the latest creations from Paris even before they reach New York! It might well be mentioned, to those who have thought of Argentine as a trackless prairie, that the country has over 25,000 miles of well-equipped and well-operated railway, and a greater mileage per capita than any European country. Uruguay, with a population of a million and a quarter, has eight head of cattle and over twenty head of sheep for every man, woman and child. How many people realize that Argentine alone supplied, in 1912-1913, more than one-half the corn entering the international trade of the world; that her exports of corn in 1913 were greater than the exports of all the other corn exporting countries combined; that the number of cattle in South America is greater than in the United States, Canada, Mexico, and Central America combined; and that Argentine's beef exportations have, in the last few years, exceeded in value those of any other country in the world!

Few people have any appreciation of the tremendous undeveloped resources of South America, the richness of her agricultural lands, the variety of products which can be produced, the vastness of her forests, the wealth of her unexploited mineral deposits, her unlimited acres capable of pasturing countless herds of cattle, and her great undeveloped water power sites.

South America is a veritable storehouse of wealth, the keys to which are Immigration and Capital. As the resources of the countries are developed their importance as world markets will increase more than proportionately. The United States, by force of circumstances, has now the opportunity to bind these South American countries to it by financial and commercial ties which will insure us a permanent and satisfactory position in their markets; but to do so will require careful, scientific study, intensive effort, and constructive leadership.

Business Education Necessary.

To take the fullest advantage of the opportunities which are now ours, requires the education not only of our masses but of our business men, our bankers and our leaders themselves. The people of this country must be taught that a large foreign commerce means permanent prosperity. A public opinion must be created that will compel our legislators to inaugurate a definite policy of helpfulness on the part of the government. Such a policy would contemplate the passage of measures removing the handicaps under which our merchant marine is now operating and providing for its rehabilitation; laws permitting combinations of American manufacturers in export trade so as to be able to meet on equal terms foreign competition in foreign markets; the scientific readjustment of our tariff so as to prevent the dumping in our markets of the products of foreign corporations; the adjustment of railroad rates so as to permit the manufacturer in the interior to bring his goods to a shipping port at such a price as will enable him to compete successfully in a foreign market; and the formulation of a definite policy for the encouragement and protection of American investments in foreign lands.

The American manufacturer, on his part, must undertake a scientific study of market possibilities the world over. He must inform himself of the demands of foreign markets, the style and character of goods wanted, and he must be prepared to meet the demands of his foreign customers. He can not compute the price until he knows exactly what it costs him to produce. Confronted as he is by increasing labor costs, he must meet the situation by more efficient organization and greater economies in manufacture. Co-operation in sales campaigns for the development of foreign markets will be found necessary to keep down the cost of developing these markets.

The branches which have been established by the National City Bank will be prepared to do active trade promotion work in the interest of our exporters, and for this purpose there have been provided on their staffs, trade experts whose entire time will be devoted to the furtherance of the interests of the importers and exporters of this country. These commercial representatives will undertake to study in a thorough and comprehensive manner the opportunities in foreign markets for the products of our factories and workshops. They will cultivate personal acquaintance among the business men of the country in which they are stationed, so that they will be in a position to give to American salesmen the personal introductions which are so valuable in all foreign countries, and in Latin countries in particular. They will supervise the making of technical investigations into the possibilities of a market for a particular product so that manufacturers in this country will be able to ascertain the price at which their goods can be sold in a foreign market, the cost of delivery to the market, the supply on hand, the manner in which the particular articles must be packed and prepared for the market, the finish and quality desired, and the samples of their foreign competitors' goods will be obtained for them upon request.

Need for Co-operative Effort.

The service as planned is for the benefit of all American manufacturers wherever located, and will sooner be developed to a point of helpful efficiency if freely used by those who are, or should be, interested in the foreign field. But to bring about effective results, it is necessary that American banks, establishing branches in foreign countries, should have the hearty co-operation of all American business interests. The main argument, so long and so vigorously urged in proof of the necessity of American banks in foreign markets, has been that American manufacturers should not be obliged to submit their invoices, and prices, and other documents required to accompany a draft sent for collection, to the inspection of foreign bankers, whose interests lay in the building up of the trade of their country. No Englishman in Argentine would do his business with, and thereby intrust his business secrets to, a German bank. It would seem right and proper to expect that American banks doing business for clients in foreign markets would pass their business through branches of American banks in such markets whenever possible. This would seem such a matter of self interest, in view of the keen competition which we may expect in our efforts to win foreign markets, that it ought not to be necessary to urge such co-operation on the part of American banks.

The nation's great opportunity is at hand. We must awaken to the occasion and begin to plan with scientific thoroughness our commercial future. The markets of the world are open to us. If our vision be broad, our spirit persevering, our efforts tactful, and our energy untiring, our success will be sure.

First Monthly Meeting, 1915-16
Thursday, October 21st, at 8:15 p. m.
Merchants' Association, Woolworth Building.

"The Efficiency of Preparedness in Business, Commerce and Finance."

Mr. John Calder, president, Manufacturers' Equipment Co., Boston, Mass.; Mr. Arthur S. March, editor "Economic World", New York; and others.

Efficiency of Preparedness in Business (CALDER) 11-8-15

An address before Efficiency Society monthly meeting in New York City on October 21, 1915, by John Calder, President, Manufacturers' Equipment Company, Boston, Mass.

The fact that a thing works proves that it is effective, but it may be far from efficient. The difficulty in measuring efficiency in preparedness increases steadily as we work back from performance and production to forecast and vision. I leave to others more competent the subject of economic laws governing all business ventures, and confine myself to inceptions not ruled out on this score.

Preparedness is a large topic, but to most business men it has a very limited significance. To some it means merely the enlargement of export business; to others a more or less organized readiness to take advantage of new opportunities at home; still others regard it as a call for greater efficiency in the tasks already in hand and in statistical analyses to that end. Some think of it as chiefly concerning campaigns of advertising, sales and distribution, and the anticipation of needs and styles; while others are wholly engrossed in producing commodities and what they have not heard in the last few years about their shortcomings would hardly be worth listening to. The fact is that efficient preparedness is demanded nowadays at every stage in business, if we are to lead the procession. It must be in evidence from the earliest thought regarding a promising idea or a generalization of value down to the elaborate formulation of specific plans to realize these ideas and to a host of precautions for launching them safely on the sea of experience and ensuring a successful voyage.

Qualities Demanded by Business Preparedness.

The efficient conducting of present business in its many aspects is the matter upon which the Efficiency Society exercises most of its thought, but "preparedness" is essentially concerned with things more or less indefinite which are yet to arrive. I will, therefore, avoid covering the well-traveled road of "the art of getting things done" and dwell upon the qualities demanded for business "preparedness" in three relations, viz: *"inceptions"; "organization"*; and *"operation"*. I know of just three ways for attaining wisdom and thereby, efficiency and preparedness on anything, whether it be business or baseball; motors or morals. These are *thinking; imitation;* and *experience*. Thinking is the finest way; imitation is the easiest way; and experience the most difficult way.

A preparedness attained solely by experience is apt to be laborious and long delayed. Reached by imitation alone it adds to our experience but fails to develop self-reliance; whereas a wise prevision attained by a well-disciplined mind concentrating on a problem is the best of all, for it is the earnest of more successes of the same kind.

Efficient preparedness in business is the result of the interplay of these three factors combined with the industry necessary to intensify them. Such preparedness, however, in the matter of inceptions cannot be always measured by the result of the project, for many other elements enter into performance and enhance or nullify the original conception. It is for this reason that good ideas poorly supported are apt to be overlooked and that efficient support of a poor scheme is so often a thankless task. Proprietors are too little given to analyses of their failures and book-keeping rarely explains anything about poor inceptions.

Inceptions:

Consider first the nature of the mental processes that lead to the initiative and originality characteristic of preparedness. The thorough co-operation of the three wisdom factors I have named and the quality of the minds engaged are the sole factors conditioning the birth of new business ideas. Mental grasp and imaginative power exercised upon the real facts of the problem are paramount here.

Obviously if the inception of a policy or plan is insufficient, inaccurate, and therefore inefficient, it matters little what may be done later by good organization and operation to support it. The best thing that can happen to the many inefficient inceptions is that they should never see the light or that they should be submitted to the test of intelligent and fearless criticism.

Unfortunately, many of them reach the rank and file in business with executive endorsement, if not also with executive origination, and are *not* open to challenge. Thereby hang not a few sad tales about rainbow chasing. Actual business occurrences show that lack of thought, lack of imitation and observation, and lack of knowledge of scientific and industrial principles are to be found in men who have inceptions of the highest importance in the control. Good business is the art of selecting probabilities and poor business is the result of taking chances on possibilities merely.

Sound concepts, visions, forecasts of coming events or needs, or estimates of conditions by leaders in finance, commerce and industry are fundamentals in business preparedness and in my experience those concerns have been most successful and stable where the fewest things, external or internal, "just happened." Lack of preparedness is always rooted in lack of prevision or inaccurate estimates and we do not know how many bad guesses at the future are made on the average by our professional forecasters or the men at the mast-head of business. One authority says 10% is the minimum and that 30% more

just escape failure. It is quite certain, however, that in our modern civilization with its international business relations, acquaintance with other people and their condition is not widespread, and planning, preparedness and clear thinking are none too prominent. The gambler's chance in this land of promise and of quick recoveries is all too common, but its days are numbered.

We need in both our home and foreign business outlooks more statesman-like qualities, for we are destined, if we accept the nomination, to lead the world's markets. We are at present the great creditor nation. Whether we shall remain so depends upon a strict attention to preparedness not yet in evidence. It is very important, therefore, to start right with the elementary ideas of projects and many of our business inceptions fail right here, though, unfortunately, the failure is sometimes concealed from the onlooker until capital has been irretrievably wasted upon the project, and then various more obvious but secondary reasons are advanced for the collapse.

There have been no more striking instances of this than in the adventures of some of our own men of finance in the realm of industry. Their failure and surprise at being unable to juggle with matter and men after the skillful fashion of the world of figures and speculation has been instructive. Again and again financiers of the keenest intelligence and success in their own special spheres have been fooled, not through the operation of the law of average, but by inceptions and projects inherently uneconomical and needing no wizard to discover this. For any efficient preparedness in such cases we look in vain. Apparently they could not resist the attractive terms either offered or possibly conceded for their capital and they swallowed the bait whole, with the reservation that any resulting burdens could be fastened on the backs of others. The first element in efficient business preparedness is to start right, trusting to no adventitious aid from capital or influence to attain that for which we have not laid secure foundations.

In the matter of the inception of great business ideas the lack of the trained mind in the adult is almost beyond remedy. But even trained minds will fail here if they lack imagination. So far as my experience goes, nearly every good idea in business, embodied finally in a project, arose from trained minds carrying thought past all verified phenomena and experiences into the realm of intuition. In other words, the step attained by what is really the scientific use of the imagination was a step beyond the last solid ground. Imagination played with and around ideas and ultimately flamed into consciousness of that which was yet to be proved. All the great originators testify to this and our ordinary minds operate in the same way. It was thus that Newton took the stupendous leap from a falling apple to a falling moon and it is a true saying that "science only gives us *hints* of what by a higher method we come to know."

But with our imagination amongst the stars, our feet must be firmly planted on the ground, for we are not dreaming here; we are consciously cerebrating and so long as we think correctly, we must think of things as they *are*. The state of mind within us must correspond to the state of things without us whenever a call comes for comparing them. Some people are intellectually dishonest and in inceptions decline to see what they do not want to see. It is as if a man relished cheating himself at solitaire. In all preparedness, therefore, a passion for facts should rule and we should be willing to go far afield to get all relevant experiences. The mind also should be a nimble one for immediate decisions may be demanded. But given a clear, clean intellectual start, the originator of business and industrial ideas should launch out boldly in mental speculation; open-minded; struggling against pre-conceptions of ideas and of people; ready to correct imperfect estimates of things and of character and to welcome any new truth when it has proved its title, despite its impact upon cherished beliefs.

Such thinking and brooding over facts, always fortified by personal experience, keen observation and resourcefulness, is the secret of power and of efficiency in business preparedness. It gives a man the ability to acquire, to marshall, to master ideas and to forge from them a weapon to conquer men, or commerce, or adverse circumstances. Such subjects as the search for new markets, the stimulation of old ones, new products, improved merchandise, reduction of the present huge cost of distribution and selling, the influence of tariffs, the present trend of these in our own and foreign countries, the demands of the export customer, his banking needs, not to speak of the purely internal problems of a business, these and a score of others should keep our inception departments working overtime at this momentous epoch in our commercial career, when the shrewdest analysis is necessary to forecast the economic result to each business of the present waste of men and capital abroad.

I have devoted most time to inceptions, to the preparedness which sets to work, for fruitful ideas, the right quality of mind, with the appropriate experience, upon the external and internal problems of the near and distant future of a business. This is not arm-chair work by any means. It may and often does call for travel and contact with all sorts and conditions of men. A few of our great corporations with international connections are highly efficient in their preparedness, but the average American concern does little to develop

preparedness for foreign opportunities. Fortunately our Department of Commerce is steadily increasing its consular service in this particular and improving its methods of circulating information, but the benefits will not be reaped by our commerce until we go after this trade in earnest and take great preliminary pains.

Organization,

I will deal very briefly with preparedness in the later stages of business. What is the next stage in order of importance? System says one; capital says another; credits say others, and so forth. The second essential in my opinion is efficient *organization*. Here again the triple discipline of thinking, imitation, experience, must be brought to bear upon the issue. One of Kipling's characters explains the failure of a cherished project by saying "Now I saw so clearly what things needed to be done that I forgot that things are only accomplished by means of *men*." He was a big man himself but he had failed to organize.

In these days organization is receiving much attention. It can never get too much, but I think a word of caution is needed. That organization is not necessarily best considered that is represented by the most imposing chart. It is quality not quantity that counts for most in the executive circle and the wise selection of the brains of a business is all-important. Not only so, but the task is not done once for all. I do not mean by this that fussy interference every few months with a stabilized staff is desirable—that is simply evidence of incompetence higher up. But men change, or fail to develop; their characters deteriorate or we make a mistake in our early choice. Hence for preparedness we must revise from time to time our selections of the human factors in business and always with the sincere desire to take the square man out of the round hole and put him where he fits.

Preparedness calls for truer discrimination of suitability than at present and, at the initial stages, more use of the science of character-reading and of the psychology and physiology of business aptitudes in which notable progress has been made in the past five years. The employment department is coming into its own. Under competent administration it is no longer a mere laborer's registry. It classifies aptitudes competently and even the higher salaried men are no longer engaged upon chance impressions of their personalities.

Operation:

I close with a few words on preparedness in the operating departments of business, which present the largest fields. The new leaven which has been fermenting in business in the last ten years has worked chiefly in industry. Management has been struggling from an art towards a science and, while I do not think it has attained that goal, the machinery of management, namely, system, has been evolving rapidly. Whether too rapidly or too completely we will not inquire here. The question before us is what is the essence of preparedness in the operating department; in its mills and plants and stores; in sales and distribution of products; and in the office, clerical and recording functions of all of these.

The new element in preparedness is the use of the "scientific method" in attacking problems. The scientific method, however, is not any particular system nor is it a tool that you can keep handy on the shelf for occasional use only. It is as old as Socrates and the dawn of science, but in its conscious application to business it is as new as today. It is essentially an attitude of the mind which influences our business conduct, plans and decisions, and causes us habitually to observe, describe, analyze and classify with accuracy the phenomena which recur in our daily round.

The result is that we apply these analyses and experiences to regulate later affairs and shape all our records so that they are interpretive and constructive. At the same time all this is confined solely to the problems where it is *economically justified.* Many men of outstanding ability in inception do all of these analyses by mind and memory, but in the operating departments we need store houses for facts and conveyors for our decisions and the real question of system economy is: what kind and how many? It is the possession of adequate discrimination in this matter that distinguishes the mere statistician from the efficient business planner and forecaster.

Conclusion:

Finally let me refer to the great importance of preparedness in labor management. Do not attend to all else and give the human problem "absent treatment." More and more society in this favored land is becoming just "all-of-us," and the capitalist or executive who does not want to belong is quite unfitted for the new industrial age. When times are tranquil and relations are harmonious, get acquainted with your people and let them become acquainted with you. Let trust and confidence be sown and you will not reap distrust and suspicion. Do not let the sowers of good-will be accompanied by a brass band or attempt to hasten the capitulation of the doubter by paternalistic policies which he cannot appreciate. Some one in all our large plants and organizations should be charged with this sort of preparedness: the sensing of the inarticulate but none the less real misconceptions—often grotesque—grievances and trivial grudges which, massed in time in narrow minds, are formidable obstacles to progress. Every business must meet the impact of troubles of outside as well as inside origin but, if you know your people and they know you, you will not have to wake up in surprise and chagrin at the number of things you felt comfortably sure of, which turn out to be *not so.*

Here then is the conclusion of the whole matter of business preparedness. It is simply the concentration on the inceptions in every department of the best minds we have and the provision for systematically widening and recording experience. Behind every method, every practice, every custom in business and society alike, lies an idea or group of ideas—a theory—a reason. Hence, the only practical things in life are ideas; the only *practical* man, the man of ideas, the man who *knows,* not merely the man who does. Behind our individual practice, whether we are conscious of it or not, lies the theory, and only he who knows it possesses the rule of the higher practice and can take the next step wisely.

It is thus, on the last analysis, to the man of sound theory and of efficient mentality we must ever look for preparedness at its best, for better ways of doing the world's work, for progress and efficiency.

EFFICIENCY SOCIETY **SEB-2**

Imagination In Salesmanship (Brisco) 12-1-15

Presented to sales Efficiency Committee by Dr. Norris A. Brisco, Iowa State University

Imagination is not as many salespeople believe, a process of thought which deals chiefly with unrealities and impossibilities, and is chiefly for the purpose of amusing them when they have leisure and time to follow its ramblings. It is, on the contrary, an absolute necessity in selling, for without it, efficient salesmanship is impossible. Imagination is an important factor from the time a customer is first approached until a sale is made. First, imagination is necessary in reading a customer's character, associating it with a type of character, and choosing the method of handling that will please and lead to a sale. Imagination is necessary in deciding whether or not an article is suitable for the use desired by a customer. Frequently it is necessary to picture a room and fittings to decide whether or not an article will harmonize with surroundings. Oftentimes it is necessary to picture a dress and decide whether or not a certain color will blend. Again, a saleslady is often called upon to picture the customer in a dress, and decide whether or not a certain article will be becoming. So enumerable instances may arise where imagination is absolutely indispensable, and without it, a serious handicap exists, and efficient salesmanship is impossible.

Imagination is absolutely necessary in analyzing methods of handling customers. If a sale is not made, what is the reason? Was it the fault of the salesperson? Is there any other method which might have led to a sale? These are a few of the questions which require careful study every time a sale is not made. If salespersons would pay more attention to analyzing the reasons why sales are not made, they would in a short time discover many of their weaknesses, and by remedying these, could easily increase selling efficiency. To be able to do so, requires a good imagination. If a sale is successful, how was it made? Was the case any different from an ordinary sale? Was there anything new introduced which would be of service in handling future customers? All these considerations are useful in increasing selling efficiency, and require a good imagination. If salespersons would spend half an hour each day in analyzing failures in making sales, and finding the reasons therefor, it would be time most profitably spent. How many salespersons carry on this practice? It should be emphasized with salespersons as one of the best habits they could possibly develop. Managers should insist that salespersons follow this practice on account of its close relation to selling efficiency.

Images are the materials out of which imagination has to build its structures. Professor Betts says that nothing can enter the imagination any more than it can the memory, the elements of which have not first come into our experience, and then been conserved for future use in the form of images. A person cannot imagine a thing which is absolutely new and original in all its parts. The parts may have been changed somewhat, or may be combined differently from what they originally were, but essentially they are the same. Color means nothing to a person who has been blind from birth. This does not mean that imagination cannot construct an object which has not been established as such in past experience because such is its work. Professor Betts says that imagination takes the various images at its disposal and builds them into structures, which may never have existed before and which exist now only as structures of the mind. In the new structures, there is not a single element which is not familiar to us in the form of an image of one kind or another. The form is new, but the material is old. The individual power in imagination consists in being able to see the old in new relations, and so constantly build new structures out of old material.

Imagination may be divided into two classes, reproductive and productive. The first class recalls images of past experience, and the second combines past experiences in new forms. This is not done by creating new elements, but by arranging existing elements in new ways. The first class is closely allied to memory, while the second depends upon our constructive ability in taking elements from past experience, and combining these in new ways to produce new things. A good memeory is essential to a good imagination. A good memory and a good constructive ability are two essential factors for a good imagination. A salesperson without imagination is only an order-filler. How often during a day must a salesperson construct a new manner of treatment of customers from past experiences? Arguments must be changed for almost every customer. The salesperson must construct a new line of argument with new variations with almost every sale. No two customers are alike, and in order to make the desired impression, selling points often must be presented in a dozen different ways during a day. A salesperson in making a sale is required to arrange old elements in new ways to meet various situations. This depends not only on a good memory, but demands a quick and ready mental activity and good constructive power, and is required to handle customers and present selling arguments in the best possible way to convince and to make sales. Every salesperson should be thoroughly impressed with the close relationship existing between imagination and successful selling.

The imagination essential for efficient selling is largely acquired, and not a natural gift. This being the case, there is little excuse for any salesperson not possessing the imagination that will assist in selling. The question arises, how may the imagination be cultivated? The first essential is thorough knowledge. The more thorough a salesperson's knowledge, the larger stock of images on hand for future use. A thorough knowledge of human nature, goods, and methods of sale, are absolute prerequisites of good imagination. This furnishes the required number of images from which must be drawn materials for building the line of attack for every customer.

The imagination should not only be trained carefully, but should always be kept healthy and under reasonable control of will. Such an imagination will not only assist in a salesperson's work, but will add greatly to joy and pleasure during hours of leisure, rest, and repose. It is therefore important to have a supply of the proper kind of images to give pleasure when not at work. The brain should be fed like the body. The food should consist of the widest range of knowledge within one's reach. Salespersons should choose worthy, upright, and good companions, meet different classes of people, observe carefully, and use the selective faculty in picking out the best of them. They should make companions of good books, good magazines, and good newspapers. These furnish a fertile field to gather images upon which imagination works. Salespeople should be careful and keep their thoughts and secret contemplations pure and clean, refuse absolutely to think of immoral things, because such prove fertile ground to disease imagination and to partially or even wholly destroy it for efficient selling. A diseased imagination causes immoral images to arise continually in the mind, and is fatal to efficient selling. Many salespersons owe their failure and downfall to diseased imaginations. If salespersons wish to reach the greatest possible selling efficiency, they should protect their minds from foul thoughts as carefully as they protect their bodies from poisons. Wholesome thoughts during hours of leisure, and proper thoughts and images during hours of work are essential for a good imagination.

Selling has its peculiar kind of imagination. The building of new structures is practical and creative. The demands are a good supply of images, the ability to analyze quickly present conditions, and to arrange elements of past experience to successfully meet a particular case. This constructive faculty of the mind cannot be directly trained, but on the contrary its training must be indirect. The development of a careful analytical habit of observing is a necessary prerequisite. General development of the mental faculties assists in developing imagination. Thorough knowledge of goods, human nature, methods of sale, and self, is an absolute essential. The foregoing, with a discriminating mind capable of exercising good judgment, and developed to think quickly and decide without hesitation, give the necessary requirements for a creative and constructive imagination adapted for selling efficiency.

Society Affairs

5-31-16

To all Members:

Your Board of Trustees has pleasure in submitting the following report on the Society's operations for March, April and May, 1916:

ACTIVITIES

Journal

The improved character of the material in the Journal reflects the efforts of Dr. Brisco and Mr. Hayward, with their editorial board. The Journal is now receiving more recognition from libraries, non-members, etc., than at any other time in the Society's history. You should realize that the growth and improvement of the Journal depend to a great extent upon your co-operation, and that Mr. Hayward will be glad to receive your suggestions at any time. These should be directed to him at the Society's office.

Bulletins

The following bulletins have been issued since our last report:

OMB—3	Employment Plan (Blackford)
OMB—4	Employment Department Methods (Rumely)
OMB—5	Bibliography of Business Management (Nystrom)
SEB—5	Bibliography of Business Management (Nystrom)
FEB—5	The Brief for Scientific Management (Farnham)
OMB—6	Training Employees: Commercial and Financial (Schwedtman)
FEB—6	Handling Men (Radford)

A number of members have taken advantage of the opportunity, noted in our last report, to secure quantities for distribution. This is an effective method of calling the attention of interested parties to the activities of the Society.

Advisory Board

We are pleased to advise that the following gentlemen are co-operating with the Society as members of the Advisory Board:

John Calder, President The Metals Coating Co. of America, Boston.
Walter H. Cottingham, President The Sherwin Williams Co., Cleveland, O.
Miles M. Dawson, Attorney & Consulting Actuary, New York.
Joseph P. Day, Real Estate, New York.
Geo. W. Dickerman, Vice-President Remington Typewriter Co., New York.
Harrington Emerson, Efficiency Engineer, New York.
John Hays Hammond, New York.
Hamilton Holt, Editor The Independent, New York.
L. J. Horowitz, Vice-President Thompson-Starrett Company, New York.
Joseph French Johnson, Dean School of Commerce, N. Y. University, N. Y.
Alfred Knight, The Fleischmann Co., Cincinnati.
Morris Knowles, Consulting Engineer, Pittsburgh.
Adolph Lewisohn, Adolph Lewisohn & Sons, New York.
William L. Lyall, President and Treasurer Brighton Mills, Passaic, N. J.
M. M. Mix, President Dodge Manufacturing Co., Mishawaka, Ind.
W. B. Richards, Gunn, Richards & Co., New York.
R. P. Tinsley, Secretary-Treasurer Amer. International Corp., New York.
Henry R. Towne, Chairman The Yale & Towne Mfg. Co., New York.

New Members

The Trustees have elected to membership and wish to introduce:

J. F. Wishart,	Sales Auditor, Du Pont Co.,	Wilmington, Del.
F. G. McKelvy,	V. P. Alpha Portland Cement Co.,	Easton, Pa.
Mary B. Graves,		Van Lear, Ky.
C. B. Waterman,	J. D. & A. B. Speckels Sec. Co.,	San Francisco, Cal.
W. C. Fisher,	The Flatbush Gas Co.,	Brooklyn, N. Y.
J. F. Andrews,	Kaul Lumber Co.,	Birmingham, Ala.
Paul K. Rogers,	Skinner Chuck Co.,	New Britain, Conn.
C. F. Wray,	Henry Wray & Son, Inc.,	Rochester, N. Y.
H. E. Viola,	The Schwarzenbach Huber Co.,	West Hoboken, N. J.
R. A. Bryant,	Frederick H. Hurdman,	Syracuse, N. Y.
Joseph H. Lyon,	Equitable Trust Co.,	New York.
R. E. Bell,	Atlantic Terra Cotta Co.,	New York.

The Society's office has this year made no systematic or special effort to increase the membership, the Trustees preferring to use all available funds in service to our present membership. The increase shown is one of the many evidences of growing interest in the Society and its work.

Legislative Propaganda

Some of our members are under the impression that the Committee of Ten (to oppose legislation antagonistic to efficiency in American industry) is a committee of the Society. Although a number of the Committee are members of the Society, and the movement was initiated by them, the Committee is operating independent of any Society and is working with its own funds raised for the purpose.

The letter quoted below indicates the development of the work.

May 29, 1916.

Mr. A. W. Kimber, Sec.,
Efficiency Society,
52 Broadway, New York.

Dear Sir:

Complying with your request I will outline briefly the situation in reference to the Anti-Time Study and Bonus measures pending in Congress.

Following the organization of this committee, in which your members took an active part, a pamphlet entitled "A Call to Arms" was prepared and is being widely distributed throughout the country and circular letters have been sent to several thousand individuals and organizations, with the object of drawing attention to the vicious Tavenner and Van Dyke bills and similar measures.

The Tavenner bill, which was referred by the House to its Committee on Labor, is the broadest in its effect and was the first to receive action.

Hearings on the bill were promised but the Committee on Labor voted to report this favorably after listening "in executive session" to a few who favored its passage, notably Mr. Tavenner and Mr. Alifas, the President of the machinist's union, who is reputed to have drafted the measure. This situation was discovered before the report was actually transmitted to the House and on protest of Mr. Emery it was delayed and hearings were offered on very short notice to which the Committee of Ten sent seven representatives to present data and arguments. For those interested the report of these hearings may be obtained by application to the Government Printer, Washington, D. C.

This bill was reported favorably by the Committee on Labor of the House, but was accompanied by a minority report prepared by Mr. Browne of Wisconsin, which included much of the testimony submitted by the Committee of Ten.

It is believed, however, that the proponents of these measures will center their efforts on securing riders to the Post Office, Army, Navy and Fortification appropriation bills. Senator Hughes of New Jersey has already offered such a rider to the Post Office appropriation bill, and the Naval appropriation bill now under discussion in the House contains the anti-efficiency clauses. As these appropriation bills are likely to be considered under special rules limiting debate there is grave danger of their passage with the vicious clauses included.

It cannot be too strongly emphasized that such measures will not only increase the cost to the Government for this work but will also place the Government in the position of opposition to modern efficiency methods and thus facilitate the extension of similar measures to privately owned and operated industries.

The measures are so manifestly evil in their effect that with the exception of a few Congressmen all of the many letters received by the Committee of Ten have been unqualifiedly against their passage. The Secretary of War and many members of the Naval Consulting Board, composed of the leading engineers of the country, have come out strongly against them.

In spite of this there are many Senators and Representatives who do not understand the import and destructive nature of these measures, and I trust the Efficiency Society will use every power at its command to advise them

Yours very truly,
(Signed) COMMITTEE OF TEN,
W. Herman Greui,
Secretary.

Meetings

The Meetings Committee, under the Chairmanship of Mr. M. Lawrence Havey, has provided monthly dinner meetings of increasing interest and value. The meetings of the last three months formed part of the series of four on Problems of Management begun with the February meeting on Employment. The subject for March was Training, for April Management, and for May Compensation.

September Convention

The Trustees are pleased to announce that Mr. Willis B. Richards, of Gunn, Richards & Co., has been appointed Chairman of the September Convention Committee. He will be assisted by a number of the New York members, among them Mr. Havey, who was responsible for the very successful dinner meetings of the past season. The Convention Program will be a development from the Problems of Management series of the dinner meetings, full announcement of which will be issued very shortly.

Treasurer's Report

Receipts January 1 to May 31	$4,169.03
Disbursements same period	1,691.14
Balance	$2,477.89

Secretary's Report on Expenditures, March 1 to May 31

1. Society's Office:		
Stationery, printing, etc.	$37.85	
Postage	52.40	
Salaries	180.00	
Sundries, rent, 'phone, etc.	82.36	
		$352.61
2. Service:		
Journal, printing	$252.00	
Journal, postage, etc.	34.50	
Bulletins, printing	188.20	
Bulletins, postage, etc.	70.58	
Meetings	38.83	
		584.11
		$936.72

Budget Report January 1 to May 31, 1916

	Budget	Expended	Budget, Dr.	Budget, Cr.
Stationery, postage, etc.	$225.00	$245.47	$20.47	$27.50
Salaries	325.00	297.50	......	27.50
Rent, telephone, furniture, etc.	277.50	259.41	......	18.09
Journal, printing	500.00	340.50	......	159.50
Journal, postage, etc.	65.00	51.07	......	13.93
Bulletins, printing	225.00	271.45	46.45	......
Bulletins, printing	225.00	271.45	46.45	....
Bulletins, postage, etc.	180.00	157.08	......	22.92
Meetings	75.00	67.16	......	7.84
Committees	100.00	......	......	100.00
Sundries	......	1.50	1.50	....
	$1,972.50	$1,691.14	$68.42	$349.78
	1,691.14			68.42
Net budget credit	$281.36			$281.36

BOARD OF TRUSTEES,
A. W. KIMBER, Secretary.

Society Affairs

8-18-16

To All Members:

Fall Convention.

After very careful study your trustees have accepted the suggestion of the Convention Committee that the Fall Conference for 1916 be held in New York City, November 16, 17 and 18. A study of the skeleton program given below will make the reasons for this decision apparent.

The subject for discussion will be:

AFTER THE WAR, WHAT?

Present abnormal conditions must be followed by readjustments. To what extent we shall be affected by subsequent conditions, and whether favorably or unfavorably, will largely depend upon the preparations made in advance to meet them.

Even though we may not be able to predict with accuracy, we certainly can at least plan two courses of action, one for favorable and the other for unfavorable developments.

Our problem, therefore, is:

What can we do, should we do to meet after-the-war conditions?

Our study naturally divides itself into four topics:

(*a*) In the light of present conditions abroad, what is the foreign situation likely to be?
(*b*) What are existing conditions in this country?
(*c*) What will the conditions be in this country after the war?
(*d*) How shall we meet these new conditions?

It is still too early to announce the names of speakers but we can now assure you that the biggest and brainiest men of the country will be on the program.

Our Society, composed of men disinterestedly seeking the way to greater efficiency, is peculiarly well situated to call a conference, open to all, that may prove of inestimable value to the industries of the country.

The problem that will be discussed is one far-reaching and vital to all our interests. To remove it from the political arena the date was changed from our usual time so as to bring it after the coming election. Invitations will be extended to workmen and representatives of our industries throughout the country and the interest already noted made it imperative that one of the larger cities should be selected. The hearty co-operation of other societies is anticipated and the development of the plans now in charge of the Convention Committee (under the Chairmanship of Mr. Willis B. Richards of Gunn, Richards and Company) gives promise of the successful completion of the biggest and most valuable piece of work the Society has ever undertaken.

The details of program and other arrangements will be placed in your hands within a short time and every member is expected to attend and to bring the conference to the attention of his associates and others who may be interested.

The Trustees confidently expect your active co-operation.

A. W. KIMBER,
Secretary.

CONFERENCE PROGRAM.

Place—New York City.
Time—November 16, 17 and 18.
Topic—After the War, What?

First Session. Present foreign conditions and their prophecy, in which it is planned to present present conditions abroad in such a way as to give a concise and vivid mental picture of the probable attitude of the principal foreign countries as it may affect our industrial and commercial progress.

Thursday afternoon, November 16th, two to six o'clock—four hours.

(1) Russia.
(2) Germany.
(3) England.
(4) France.
(5) Latin America.
(6) The Far East.

Second Session, in which will be presented a clear conception of the existing industrial and commercial situation in this country as a basis for the third and fourth sessions.

Thursday evening, November 16th, eight to eleven o'clock—three hours.

(1) Finance.
(2) Marketing.
(3) Manufacturing.
(4) Labor.

Third Session, in which will be begun the survey of the future, using the same viewpoint as in the previous sessions. Conditions in this country at the close of the war, as the outgrowth of the present situation here and the future situation abroad, viewed from the standpoints of:

(1) Financing.
(2) Marketing.

Friday afternoon, November 17th, two to six o'clock—four hours.

Fourth Session, in which the survey of the future will be continued, viewed from the standpoints of:

(3) Manufacturing.
(4) Labor.

Fifth Session, in which, with the information gained from the previous sessions as a basis, we attempt to plan a course of action.

How shall we meet the situation? What is the attitude of each group (*a*) Toward the problem (*b*) Toward the other groups? What is the suggestion of each group for a constructive program?

(1) Finance.
(2) Government.
(3) Marketing.
(4) Manufacturing.
(5) Labor.
(6) Summary of the Conference.

Time Study (Merrick)

9-20-15

Presented before the Society Convention at Lake Placid Club, September 17-19, 1915
by Dwight V. Merrick, Consulting Engineer, New York.

Time studies are made for two general purposes, first to determine what, if any, improvements can be made in the conditions, equipment, etc., affecting the operator's performance of his work, and second, to determine what, if any, improvements can be made in the actual performance of the work *by* the operator. In this latter sense "Time Study" as practiced by the writer comprises the following elements:—

1. Surveying the work and all influencing conditions.
2. Analysis of the work into its elementary parts.
3. Observing and recording the time taken for each of these parts.
4. The study and analysis of these time records.

Properly speaking, time study ends here, though the term is frequently made to embrace the *utilization* of the studies in establishing standard time of performances, tabulating items for reference and the writing up of instruction cards for the performance of work. On account of the close relation of these two, I will speak of time studies with this broader meaning. Following then the analysis of the elemental time records will come,

5. The elimination of the abnormal readings and the selection of a fair final time for each elementary operation that may be used as a standard for future performance with fairness to the work and justice to the operator.
6. The writing of the instruction card and determination of proper allowance for fatigue.

Before describing the work in detail, let me indicate briefly its place in betterment work. The idea of Time Study was conceived by Frederick W. Taylor in 1883. He found it simpler and more accurate to time with a stop watch, each element of the various kinds of work, summing up its component parts for the quickest time in which a given job could be done, than to attempt to measure the quickest times for the various jobs as complete units. He sought to determine definitely how long it should take a first class operator to perform his work. His study of the problem indicated the answer to be dependent on a number of factors. These may be grouped in *two* general classes; first, those that the operator does *not* control, such as the supply of raw material, its quality, quantity, delivery and tool equipment, etc., and second, those factors within the operator's control, such as all the direct application of his own efforts to the work.

The time study under consideration deals with this second group, but let me emphasize the importance of first bringing under control and standardizing, the first or management group of factors, before any attempt is made to set standards for the operator. While it is true the studies to set standard times for the operator will usually lead to some improvement in these factors, they should not be depended upon to develop their *control*. This control should precede the application of the studies to the operator. Reversing the order invariably leads to confusion and waste.

In the following description the "operator" means the man performing the work being studied, and the "observer" means the man making the study. Taking up the various elements of the subject as enumerated above, we have:

1. Surveying the Work and Conditions.

A clear conception in the mind of the observer, of the work the operator is to perform and a knowledge of the conditions affecting it is essential to efficient time study; hence the preliminary general survey of the particular operation as a whole which includes the material at the start, the material at the finish, the various changes from one state to the other, the equipment and power available, the operator, his physical and mental condition, skill, etc. In this survey no very definite idea of time has been considered by the observer.

To the skilled observer this perspective view is very quickly secured and a little practice enables him to pick out the facts essential for record.

2. Analysis of the Work.

Having pictured the operation as a whole, the next step is the splitting up of the process into a series of elemental parts occupying small though varying periods of time. The minuteness of this division depends on the character and requirements of the study and the skill of the observer. If the distinctive elements that can be observed occupy extremely small time intervals for their performance, it may be economy to group several and treat as one element. The decision as to how minute the divisions are to be made calls for judgment in the observer only secured by training. These different sections of the operation are listed on the record sheet in the sequence in which they occur.

3. Observing and Recording Time.

With the elements listed, the observer is prepared to note and record the time required to perform each of the elementary movements or operations. This is most conveniently done with the aid of a stop watch having a dial divided into hundredths of a minute and with the hands arranged for stopping and starting without returning to zero except at the will of the observer.

In practice the observer's eye, the record sheet, the watch and the operator are brought as nearly as possible into the same line of vision, so as to reduce the movements of the eye and minimize the errors of observation. The watch is started and the time of starting of the whole operation is first recorded. As each elementary part is *completed* the watch is read without stopping it and the times noted on the record until the last element of the series is completed. The watch is then set at zero and the process repeated a number of times, dependent on the nature of the work. In some cases it is desirable not to stop the watch until the whole study is completed.

If the elementary operations require a comparatively long time and the work is being done at a uniform rate, a few complete observations suffice. On the other hand, if the elementary operations are very short and the performance of the work is not uniform, a large number of observations are necessary. This method, in which the total elapsed time is taken from the start of the series to the end of each elementary operation in the series, is known as taking "continuous time."

Taking "continuous time" is more accurate and quicker than treating each elementary operation separately and taking both starting and stopping times independent of preceding and following operations. This completes the study at the machine.

The record is next prepared for study by what is known as "taking differences." This consists in subtracting the starting time from the finishing time of the first elementary operation, and the finish time of first from finish time of second, etc., etc.—thus obtaining the length of time for each elementary operation. These differences are placed on the record over the readings of elapsed time that were taken while the work was being observed.

4. Analysis of Record.

The analysis of the recorded times may be made by the observer or turned over to some one else who is familiar with time studies. It is frequently desirable to have several work together on this. Where there is a great deal of time studying to be done, the work is greatly facilitated by functionalizing it through having a man or a group of men doing nothing but observing, another set taking the differences and averaging them (this set need not necessarily be so highly trained), and still another set analyzing the studies, arranging the tabulation of the time for ready reference, and preparing the instruction card.

Many complete studies contain elementary operations identical with those secured from studies of totally different work by the same or different workers. It is desirable, though not essential, that these previous records be at hand during the analysis.

The analyst first reads the description of the work to familiarize himself with its nature and then goes over the description of the elementary operations, comparing those of a similar nature with each other and with corresponding operations from other records. He then takes each elementary operation and in reading over the various times for this operation, notes their uniformity. This brings us to the next step.

5. Elimination of Abnormal Readings and Selection of Standards.

If the analyst notes one or more times that are either excessively high or low, these are stricken out as being due to abnormal conditions (or the observer's error). There has been no definite rule established as to how great a deviation warrants the elimination of a reading, but 30 to 35 per cent. or more is approximately the amount used. Here again the judgment of the time study man is called into play. After eliminating the excessively high and low values, the remaining times are then averaged and the result entered on the record as the average time for the elementary operation. The minimum time for the elementary operation is also picked out and set down in a column by itself known as the column of absolute minima. This process is repeated for each elementary operation.

The two columns above referred to are now considered. The column of averages shows the *average* time for each element of the work with abnormal readings discarded, while the column of minima shows the *shortest* times for each element likewise with the abnormal readings omitted.

The average for each element is divided by the absolute minimum for the same element and the result is set down in a column known as the deviation column. This column indicates the percentage that the minimum is below the corresponding average time. These deviation percentages show quite wide fluctuations in most cases, therefore the average deviation of the operator is determined and the standard times are secured by reducing the average elemental times by this average deviation factor.

Standard times so determined from one operator show very close agreement with those from a different operator of approximately the same general class, even when the corresponding elemental average times for the two men show wide variation.

A shorter method of finding this average deviation factor or "standard deviation," as it is known, would be to divide the sum of the column of averages by the sum of the column of absolute minima, but it is desirable to note the fluctuations of the several deviations from the standard or average deviation, as these indicate on which elements improvement may probably be made by the operator under observation. He can be expected to make the most improvement in performing those elements that show the greatest percentage of deviation from the average.

They form an excellent man record that is of great value in comparing the work of different operators. Work is now under way in the plant of one of my clients in which this refinement is being practically utilized with prospects of very profitable results. I hope in a future paper to give the results of this study.

6. Writing Instruction Cards with Fatigue Allowances.

Having determined the standard elementary times there remains the writing of the instruction card for future use. It is recognized that it is practically impossible for an operator to regularly and continuously perform at his best. It is desirable, therefore, to make a certain fatigue allowance which is added to the sum of the standard elemental times. This is usually done by adding a percentage of such sum which will be dependent on the *nature* of the work and also on the *amount* of work in a complete operation. This allowance in a shop making small parts in considerable quantity will be different from that used in a shop making large parts a few at a time.

An empirical formula has been deduced by Mr. Carl G. Barth from a large mass of data gathered from a shop operating under the Taylor system of management, and applies particularly to light machinery where considerable activity on the part of the operator is required.

This formula is—Percentage $= \frac{125}{1.20 + \sqrt{T}} + 20$, in which $T =$ the sum of the standard elementary times expressed in minutes. From this formula it is evident the fatigue percentage is much greater on parts where the time is very short than on parts where the time is long.

From the same shop data was obtained for the following table applicable to certain machines.

Kind of Machine	*Size*	*Percentage*
Lodge & Shipley Lathes	24″ to 30″	35 to 50%*
" " " "	48″	30%
Vertical Boring Mills	30″	40%
" " "	36″	35%
" " "	120″	25%
Horizontal " " (No. 74 Bennse)		40%
Planers	36″	40%

*35% when handling time is more than 8 minutes, and machine time double the handling time. 50% when handling time is less than 8 minutes, and machine time about equals handling time.

It is probable that more careful study will show varying percentages for all these machines, similar to those indicated for 24″ to 30″ lathes, although these figures have proved fairly satisfactory in practice.

It may be of interest to note how these figures were derived. To begin with, time studies were made and worked up as indicated above and the minimum time obtained for a given piece of work. To this minimum time a percentage was added that brought it up to about the average time recorded in the study. Instruction cards were then issued on this basis to a number of competent operators who were further instructed to follow them exactly. This means that the operators did not work unduly fast, but at a consistent steady pace. The times taken by the different operators on the same parts were then averaged and the result compared with the time allowed.

By this means, with long and careful investigations of conditions, the percentages given were finally deduced. The formula given was determined in a similar manner. As stated the work was on light machinery, the time per piece of the various jobs varied from .25 minute to 20 minutes.

The formula and table have been used satisfactorily in a number of other plants, but are given only as tentative data and more exhaustive study is needed. The formula does not apply in shops doing large heavy assembling, each assembly covering a long period of time, for the question of fatigue does not enter largely into such problems. The formula should be used only where fatigue is a factor, and then with a thorough knowledge of conditions. For heavy assembly work an allowance of 15 to 10% or even less is ample, and this is added for unavoidable delays rather than for fatigue. Such work requires more deliberation and less activity than machine operations. In shops where light assembly in large quantities is done a flat 30% allowance for fatigue has been used with fairly satisfactory results.

To illustrate the methods above described, I have chosen a study on stitching the top of a cushion for an automobile seat. While the times recorded are those actually taken for practical current use, the calculations are carried to greater refinement than is necessary in practice. This is done to show more clearly the method used.

Figure 1 shows the observation sheet.

After the general survey and notation of identifying data, the ***second step***, the analysis of the work into its elementary parts, is made and those parts noted under the heading "Detailed Operations," the complete job in this case being divided into 17 parts.

The third step, the observing and recording of the time, is indicated in columns headed 1, 2, 3, etc.

Taking column 1, the watch is started at the instant the operator starts to place the work on the machine. When this is landed on the machine, the operator glances at the watch and records the reading of .21 min., meanwhile the operator is stitching from A to B. When the operator has reached B the observer again glances at the watch and records the reading .26 min., meanwhile the operator is moving the work ready to start at C when another observation is made and recorded, .52 min. This is continued until the 17th operation (removing and landing the work on the finished pile) is completed, showing the entire time from the start of 4.54 min. The hands of the watch are instantly set at zero and the process repeated for the next piece as recorded in column 2.

Ten complete observations were taken in this case and it will be noted that continuous time was taken from the start of element No. 1 to the finish of element No. 17, in each case. Note the star in column No. 1 on line 12, which covers stitching from C to I. This indicates some unusual occurrence, and reference to the upper part of the sheet shows this was loading the machine and record is there made of the time consumed. Later on rethreading the needle is similarly recorded. This finishes the work at the machine.

The record is now prepared for study by "taking differences." Taking column 1, the initial reading, that is, zero, is subtracted from the finish time for element one showing a difference .21 which is noted. The reading .21 is subtracted from the finish time of element two, which was .26, giving difference .05, which is noted and so on through all ten columns.

The record is now ready for the elimination of abnormal readings. The analyst looks along the line No. 1 and finds under column No. 5 an abnormally high difference .26 as compared with the other differences for this same operation and strikes it out. Similarly in line two he finds under column No. 1 an abnormally low reading of .05, which is also stricken out. This is continued for each of the 17 elementary operations.

Next he goes through each line and notes, as shown, under column 18, the lowest time for each operation, except that when he comes to line 4, which is stitching from C to D, he notes this is exactly the same as operation 6, the stitching from E to F and operation 12 and 14, as indicated by the sketch. He therefore looks through the times for all these and selects the lowest time from the lot, setting it down under column 18 for each of these operations. Similarly he finds that operation 3 is same as 5 and operation 8 is same as 16. Similar operations are indicated by similar letters under column 16.

Having selected the absolute minimum for each of the 17 operations, he takes each line separately and calculates the average time (disregarding the eliminated figures) and notes under the column headed "Average," the result for the first operation being .180, the second .0832, etc., again considering similar operations together.

Following this, each reading under column 18 is divided into the corresponding average under the column so headed, the result being noted in column 19. This column shows how much the operator deviated from his average performance when he did his quickest work as recorded under "absolute minima."

These deviations for the different operations are now averaged to get what is called the "standard deviation" for the operator on this class of work. The average time of each element is then reduced by this average or standard deviation and the resultant standard times set down in the last column for use in making up the instruction card.

Figure 2 shows the instruction card to be simply a list of the operations in proper sequence, with proper allowance for preparation and fatigue. The identifying data and sketch of the work are noted with a summary of the time allowance at the top of the sheet. It will be noted that a fatigue allowance of 30% was here used.

In closing let me again caution those inexperienced in this work against attempting to set standards of work for operators by the methods described without previously having definitely brought under control the influences for which the management, rather than the operator, is responsible. With such control the use of time studies will repay all expense involved, through reduction of cost with higher wages and last, but not least, a satisfied, more prosperous and healthier working force that recognizes the joint interests of employer and employee.

OBSERVATION SHEET FORM 8-1192--MFG

OBSERVER'S NAME GAUTHIER MACHINE NO D18M 4XE DATE 12-8-1914
WORKMAN'S NAME AND QUALIFICATIONS W SMITH #1876 GOOD SUBJECT
PIECE 20204 FRONT CUSHION TOP
OPERATION STITCH PLEAT

LINE	COLUMN	START	FINISH	DIFFERENCE	NOTE	LINE	COLUMN	START	FINISH	DIFFERENCE	NOTE
12	1	2.10	3.10	1.00	LOAD MACH	10	7	1.73	2.12	39	RETHREAD NEEDLE
4	8	0.36	1.54	1.18	" "						
10	6	1.78	2.10	32	RETHREAD NEEDLE						
5	6	0.65	0.75	10	" "						

	DETAILED OPERATIONS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	ABSOLUTE 18 MINIMA	RATIO 19 DEVIATION	20	AVERAGE	MINIMUM TIME
1	LAND TOP ON MACH & START AT A	.21 .21	.17 .17	.19 .19	.18 .18	~~.26~~ .26	.17 .17	.18 .18	.14 .14	.20 .20	.18 .18								.14	1.285		.1800	.1482
2	STITCH FROM A TO B	[illegible] .26	.07 .24	.09 .28	.07 .25	.09 .35	.07 .24	.10 .28	.07 .21	.07 .27	.07 .25						a		.07	1.188		.0832	.0685
3	MOVE TOP OVER & START AT C	[illegible] .52	.13 .37	.12 .40	.17 .42	.19 .54	.12 .36	.12 .40	.15 .36	13 .40	.18 .43						b		12	1258		1510	.1243
4	STITCH FROM C TO D	.30 .82	.27 .64	.27 .67	.28 .70	.29 .83	.29 .65	.30 .70	* .33 1.87	.26 .66	.27 .70						c		.23	1.185		.2725	.2244
5	MOVE TOP OVER & START AT E	.15 .97	.17 .81	.17 .84	.15 .85	.15 .98	* .18 .93	.15 .85	.13 2.00	.14 .80	17 .87						b		12	1.258		.1510	.1243
6	STITCH FROM E TO F	.28 1.25	.31 1.12	31 1.15	.28 1.13	26 1.24	.29 1.22	.35 1.20	.23 2.23	.29 1.09	.26 1.13						c		23	1.185		.2725	.2244
7	MOVE TOP OVER & START AT G	.14 1.39	.14 1.26	.13 1.28	.16 1.29	13 1.37	.13 1.35	.14 1.34	.14 2.37	.14 1.23	.13 1.26								13	1.062		.1380	.1136
8	STITCH FROM G TO H	.16 1.55	[illegible] 1.38	.17 1.45	.18 1.47	.18 1.55	.17 1.52	.16 1.50	.16 2.53	.17 1.40	.16 1.42							d	15	1.158		.1737	.1431
9	PARTLY TURN TOP & START AT E	28 1.83	.29 1.67	.29 1.74	.20 1.67	.18 1.73	.26 1.78	.23 1.73	.22 2.75	20 1.60	.23 1.65								18	1.322		.2380	.1960
10	STITCH FROM E TO G	.10 1.93	.09 1.76	.10 1.84	.08 1.75	.10 1.83	* .08 2.18	* .08 2.80	.10 2.85	.08 1.68	.07 1.72						a		07	1.188		.0832	.0685
11	MOVE TOP OVER & START AT C	17 2.10	.22 1.98	21 2.05	.18 1.93	.16 1.99	.18 2.36	15 2.35	.18 3.03	.17 1.85	.17 1.89								.15	1.194		.1790	.1474
12	STITCH FROM C TO I	* .32 3.42	.25 2.23	.24 2.29	.26 2.19	.24 2.23	.31 2.67	28 2.63	.25 3.28	30 2.15	.30 2.19						c		.23	1.185		.2725	.2244
13	MOVE TOP OVER & START AT A	.27 3.69	.24 2.47	23 2.52	.26 2.45	24 2.47	.19 2.86	.21 2.84	.23 3.51	.17 2.32	.22 2.41								17	1.330		.2260	.1861
14	STITCH FROM A TO H	.28 3.97	.26 2.73	.25 2.77	.27 2.72	.23 2.70	.27 3.13	.30 3.14	.24 3.75	.34 2.66	24 2.65						c		23	1.185		.2725	.2244
15	MOVE TOP OVER & START AT B	.22 4.19	.27 3.00	.20 2.97	.20 2.92	.19 2.89	.22 3.35	.21 3.35	.18 3.93	.21 2.87	.19 2.84								18	1.155		.2090	.1721
16	STITCH FROM B TO F	.19 4.38	17 3.17	.21 3.18	.17 3.09	.15 3.04	.20 3.55	18 3.53	.16 4.09	17 3.04	.19 3.03							d	15	1.158		.1737	.1431
17	REMOVE & LAND TOP ON PILE	16 4.54	.13 3.30	.11 3.29	.16 3.25	16 3.20	.13 3.68	12 3.65	19 4.28	17 3.21	.15 3.18								.11	1.345		.1480	.1219
18																			17)	20.641			2.6541
19															AVERAGE DEVIATION =					1.2141			
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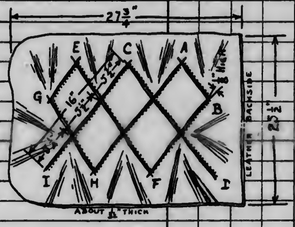
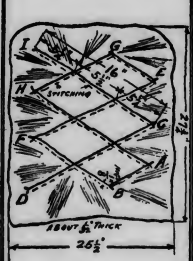


Fig. 1

DEPARTMENT		MATERIAL		MACHINE NO.	LOCATION	DRAWING NO.
D18M	INSTRUCTION CARD	Leather	MACH.	4XE	D18M	20204



FRONT CUSHION TOP
NAME OR SYMBOL OF PIECE

Stitch Pleats
OPERATION

PREPARATION TIME 9.00 Min.

TIME PER PIECE 3.60 Min.

	DETAIL INSTRUCTIONS	PREPARATION	TIME WORK SHOULD TAKE
1	Change card at window	2.00	
2	Return to work	.50	
3	Get stock from rack	1.00	
4	Prepare bobbins & re-thread needles (0.0017 per inch of stitching X96½")		.16
5	Land top on machine & start at "A"		.15
6	Stitch from A to B		.07
7	Move top over & start at "C"		.12
8	Stitch from C to D		.23
9	Move top over & start at "E"		.12
10	Stitch from E to F		.23
11	Move top over & start at "G"		.11
12	Stitch from G to H		.14
13	Partly turn top & start at E		.19
14	Stitch from E to G		.07
15	Move top over & start at "C"		.15
16	Stitch from C to l		.22
17	Move top over & start at A		.18
18	Stitch from A to H		.22
19	Move top over & start at B		.17
20	Stitch from B to F		.14
21	Remove & land top on pile		.12
22	Remove stock to rack (Finished Rack)	1.00	
23	Get card signed	2.00	
24	Take to window	.50	
		7.00	
	Allowance on Fatigue --	2.00	
	Preparation --	9.00	
			2.79
	Allowance for Fatigue-	------	.81
	Time per piece ---	------	3.60

	DATE	SIGNED BY
WHEN WORK CANNOT BE DONE AS SHOWN, REPORT MUST AT ONCE BE MADE TO MAN WHO SIGENED THIS CARD.	1/22/15	D.V. MERRICK

Fig. 2

EFFICIENCY SOCIETY TSB-1-8

Discussion on Time Study

11-13-15

Discussion which followed the presentation of the paper on time study delivered by Dwight V. Merrick at the Efficiency Society Convention at Lake Placid Club, September 17–19, 1915; by George De A. Babcock, production manager, H. H. Franklin Manufacturing Company, Syracuse, N. Y.; Sanford E. Thompson, consulting engineer, Boston, Mass.; John J. Porter, vice president and general manager, Security Cement and Lime Co., Hagerstown, Md., and W. Herman Greul, Otis Elevator Co., New York.

By Mr. Babcock:

This paper treats of time standards for the mechanical movements of machines and men. It is far-reaching in its importance since it covers these essential fundamentals of industrial activity with specific instructions for treatment.

The principles in this paper deal with varying compensation for varying accomplishment upon standardized work. The standardization is established by definite measuring methods on the best performers that are available in the average field of labor. Man is circumvented in his movements by the standardized material and equipment with which he works. The standarization of equipment necessitates the standardization of practice in its use.

The time of mechanical movements has been fundamental in the design of the machine. It has been assumed, however, that the mechanical movements of men differ widely in different individuals. This is very true, since it is not expected that all men will perform the same kind of work.

Human beings differ widely in their mental and mechanical ability, and this is no more clearly illustrated than by competitions in athletic events in which the physically perfect, coupled with strong mental activity, accomplishes with precision, time and time again, given distances or weights. The remarkable thing to the casual observer is that a final limit is reached where the percentage gained or lost in each effort is infinitesimal compared to the total. In a 200 yard dash a race would be impossible without the split second watch. By going through proper training, and by consistent practice, men apparently unfit for athletic competition are eventually able to acquire a close approach to the time limit for high accomplishment. Without doubt the physical being is a mechanical construction and is limited to the mechanical movements which it can perform.

Since the human body is directed by the mind, and this direction seems capable of giving a considerable number of instructions at one time, it is no wonder that there is an assumption that man is an uncontrolled being, and that different men are dissimilar.

Psychology has brought home to us the fact that the movements of human bodies, but directed by individual minds, will never perform particular movements identically alike. However, as the same distances in the same time can be consummated with exactness by widely varying designs of vehicles, each more or less perfectly from the standpoint of mechanical effort, just so each human being performing differently, accomplishes the same result, but with varying efficiency of operation.

Time study records a standard way of accomplishing a definite thing and indicates the most efficient performance for men suited to the work using special equipment designed for the purpose. Different workmen may by using the same equipment, operate somewhat differently than standard. However, the equipment, space and material combined with quantity of stock to be produced are the chief standardizing influences. The time study records them.

In the H. H. Franklin Manufacturing Company some very essential results have come from the application of time study in helping to control the schedule of product toward a marked reduction in the "work in proeess" account, when used in conjunction with our controlling methods. Parts for assemblies are practically in on time.

The effect of time study on parts cost is well illustrated by nine studies out of 240. The ones mentioned are selected as returning the greatest results; in wood working, upholstering, machine work, machine assembly, the savings were traced directly to the study and the resulting change of methods. The nine operations mentioned returned savings equivalent to three quarters of all of the overhead expenses of the department, amounting to something over $13,000 per year. The expense of obtaining these studies, the depreciation and repair charge for extra equipment amounted to $2,200.

Of all studies taken, the average reduction in time required to do the work over our best previous effort without time study, but with premium rates on "estimated time" is approximately 26 per cent. Time study taken alone without proper control will prove to be quite an expense instead of saving. With good control and the use of the information gained by time study, a workman may be paid a materially higher rate than under other known methods of planning payments for a given effort.

The placing of time study rates has not affected our personell: No men have been laid off due to an inability to make full rates, yet 20% of our force is over 50 years of age.

No written discussion could enhance this paper since it is practically fundamental and it is written by a man who, with Mr. Taylor, developed this science, and it may well be called the "Science of Time Study." It has been my pleasure to associate somewhat two years with Mr. Merrick, and I commend earnestly that each of his statements be implicitly believed. I congratulate Mr. Merrick on a mental attitude which permits him to make public so important a document.

By Mr. Thompson:

Time study, as indicated by Mr. Merrick, is a fundamental necessity in any detail study made for the purpose of improving methods of management. This applies not merely to the operation of determining standard times and fixing rates, but to selecting the proper layout and routing of the work. Time study determines the easiest, best, and simplest ways of performing an operation. One cannot tell how to plan a series of jobs unless it is known how long each one will require. The greater the exactness in laying out such work, the more accurately must the time be known. Time study is the only practical way to distinguish between necessary and unnecessary movements which an operative must perform, or to show the method that will produce results in the shortest time.

Thus while time study is of but little practical value when taken by itself, it is one of the essential features of modern management both from the standpoint of the employer, whose aim it is to arrange his work so as to handle it by most economical methods, and of the employees, whose aim it is to obtain the largest possible income per day, and who, therefore, must be shown how to work to the best advantage so as to give the required production.

By Mr. Porter:

There are certain staple industries in which the output depends far more on process efficiency than on manual efficiency, and this is the case in the business with which the writer is connected, the manufacture of cement and lime. Our principal opportunity for improvement by means of time study is in our packing departments and we have made such studies and applied a bonus system with excellent results in our cement plant.

The most interesting application in our work, however, has been in connection with handling of lime from the base of our kilns and its loading upon cars. This case presented unusual difficulties on account of the large number of operations involved, the frequent changes in the sequence and nature of the operations, and the fact that the amount of work to be done varies from day to day and is not under control of the management.

As finally worked out, piece rates were set on each operation and a form of time sheet was devised on which the work done by one man individually could be credited to him while gang work could be split up among the members of the gang.

The following table shows for a portion of the work the methods used in calculating rates and in assembling operations into units which could be measured and recorded:

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The most interesting application in our work, however, has been in connection with handling of lime from the base of our kilns and its loading upon cars. This case presented unusual difficulties on account of the large number of operations involved, the frequent changes in the sequence and nature of the operations, and the fact that the amount of work to be done varies from day to day and is not under control of the management.

As finally worked out, piece rates were set on each operation and a form of time sheet was devised on which the work done by one man individually could be credited to him while gang work could be split up among the members of the gang.

The following table shows for a portion of the work the methods used in calculating rates and in assembling operations into units which could be measured and recorded:

	Unit	Stand. Time Mins.	No. Men	Man Hrs.	Hour Rate	Piece Rate
Drawing kilns						
Putting down cross ties	Draw 1 K.	3	1	.05	.20	.01
Drawing kiln	"	13.5	2	.45	.20	.09
Total rate per draw						.10
Sending lime to hammer mill	Draw 1 K.	30.	1	.50	.20	.10
Putting lime on conveyor Handling motor	"	30	1	.50	.20	.10
Total rate per draw						.20
Loading #3 selection lime						
Putting lime on conveyor	Ton loaded	6	1	.10	.25	.02
Picking lime, est. 67% #3	"	6	2	.20	.25	.05
Shoveling lime back in car	"	12	1	.20	.25	.05
Returning core to H. M., est. 33% core	"	12	1	.20	.25	.05
Getting car ready & closing door, including cleaning car, @ 20 T per car	"	2	3	.10	.25	.025
Total rate per ton loaded						.200

Loading run of kiln

	Unit	Stand. Time Mins.	No. Men	Man Hrs.	Hour Rate	Piece Rate
Putting lime on conveyor	Ton Load.	6	1	.10	.25	.025
Shovelling lime back in car	"	12	1	.20	.25	.05
Getting car ready to load, etc.	"	3	2	.10	.25	.025
Total rate per ton loaded						.10
Packing barrel lime						
Filling bbls. with lime	Bbl.	1.25	1			
Pounding lime in top of bbl	"	.50	1			
Putting in head	"	1.65	1			
Nailing in head	"	1.30	1			
Trucking to loading platform	"	1.50	1			
Getting empty barrel	"	.30	1			
Total rate per bbl.		6.50	1	.11	.25	.03

In addition to the piece rates there is also provided a daily bonus of 20 c. to each man whose earnings exceeded $2.00. This gives an extra incentive to get the work done with the fewest possible number of men. The rates are guaranteed by the management against change unless methods or equipment are changed, and means are provided by which the men can know from hour to hour how their earnings are running. Special steps were taken to guard against any falling off in quality when the change was made, and as a consequence, the number of complaints received has been materially decreased.

The net results of the plan are shown as follows:

	Old Arrangement (Day Work)	New Arrangement (Piece Work with Bonus)
Average number of men per shift	7	3
Average daily wage per man	$2.16	$2.90
Average cost per ton of bulk lime loaded	0.35	0.17
Approx. total saving per mo.	——	$360.00

By Mr. Greul:

While having carried out time studies along the lines indicated by Mr. Merrick for only a brief period, I was engaged some years ago in cost reduction and used methods fundamentally the same. The work studied was the erection of elevators in buildings of various kinds. Many of the conditions affecting the work were outside the control of my company and it was therefore deemed inadvisable to go to the refinements in time study described in this paper. First a general survey was made, then the work was analyzed, split up into a number of recurring elements, these elements studied, compared, and eliminated where possible or shortened and improved. The result was work done better at about 25% less cost with the workmen receiving 20% higher wages and the customer raising 50% less howl about delays. Were it possible to have the control of conditions in this field and to apply the time study methods that Mr. Merrick advocates, I have no doubt the above percentages could be greatly increased, with the possible exception of the last.

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